







LETTERS AND PAPERS

O N

Agriculture, Planting, &c.

ADDRESSED TO THE

*Bath and West of England Society,*

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and Commerce.

VOLUME VI.





# LETTERS AND PAPERS

O N

Agriculture, Planting, &c.

SELECTED FROM

THE CORRESPONDENCE

O F T H E

*Bath and West of England Society*

FOR THE ENCOURAGEMENT OF

AGRICULTURE,

ARTS,

MANUFACTURES,

AND COMMERCE.

VOL. VI.

BATH, PRINTED, BY ORDER OF THE SOCIETY,

BY R. CRUTTWELL;

AND SOLD BY C. DILLY, POULTRY, LONDON,

AND BY THE BOOKSELLERS OF BATH, BRISTOL, SALISBURY,

GLOUCESTER, EXETER, &c. &c.

M DCC XCII.



# C O N T E N T S

O F

## V O L U M E VI.

	PAGE
<b>I</b> NTRODUCTION —————	vii
A Series of Letters on Planting and the Management of Woods, by <i>Thomas South</i> , esq. —————	1
LETTER I. Dimensions of an Oak, felled in the year 1758 in Langley Wood, near the New-Forest ———	8
———— II. On the Growth of Elms —————	11
———— III. On Abele —————	23
Alder —————	25
Ash —————	26
Beech —————	28
Fir —————	32
———— IV. Description of Fyfield's Oak, &c. —————	33
Dimensions of the Bull Oak —————	46
———— V. An Essay on the Growth of Oaks, and the produc- tion of crooked Timber for Naval Purposes ———	47
Additional Letter, by the same, on his Intention of publishing a Treatise on the Management of Wall-Fruit Trees ———	64
A Description of the Instrument called a Sward-Cutter, invented by the Hon. <i>Robert Sandilands</i> —————	72
Queries of Mr. Le Blanc, respecting the Culture of Turnip- Rooted Cabbages, with Answers to the same, by Sir <i>Thomas</i> <i>Bevor</i> , bart. —————	87
Letter on various Subjects, from Sir <i>Thomas Bevor</i> , bart. ———	89
Questions addressed by the Commissioners of the Land Revenue, to the Chairman of the Quarter-Sessions of the County of Nor- folk; with Answers transmitted. <i>By the same.</i> ———	94
On Mowing Cabbage. <i>By the same.</i> —————	101
On the characteristick Distinctions of Plants. <i>By the same</i> , ———	103
On the best Method of planting Mangel-Wurzel, and of its Use and Value for feeding Pigs, Cattle, &c. <i>By Mr. Joseph Wimpey</i> ———	106
Of the Cause of Smut in Wheat. <i>By the same</i> —————	116
On the Drill-Husbandry. <i>By the same.</i> —————	125
On Field-Mice, and on the transplantation of Wheat. <i>By Mr.</i> <i>John Wagstaffe</i> —————	127
On the Grafting of Crab-stocks, White-thorns, &c. with Apples and Pears. <i>By the same.</i> —————	132
On the Saccharine quality of Pears, Maple-Sugar, &c. <i>By</i> <i>the same.</i> —————	138
On Mangel-Wurzel, and other Crops for feeding Cattle. <i>By</i> <i>J. Franklén</i> , esq. —————	139

On Wool, Sheep, &c. <i>By the Rev. Charles Onley</i>	143
On Planting, Grafting, and making Cyder. <i>By Mr. J. N. Morfe</i>	151
On a particular kind of Apple, &c. <i>By Mr. J. Holt</i>	160
On transplanting Wheat. <i>By the same</i>	163
On the loss of Weight in Grain, &c. <i>By the same</i>	167
Observations on the Subjects proposed in a circular Letter, by the Bath and West of England Society. <i>By Thomas Davis, esq.</i>	172
Observations on the supposed neglect and scarcity of Oak Timber. <i>By the same</i>	177
On Smut in Wheat, and a new Method of sowing by Hand, &c. <i>By Mr. James Wyborn</i>	186
On Smut in Wheat continued. <i>By the same</i>	191
Thoughts on the same Subject. <i>By W. R.</i>	195
Further Remarks on the Cause of the Smut in Wheat. <i>By Mr. Joseph Wimpey</i>	198
On Potatoes. <i>By the same</i>	206
On the best Method of providing for the Poor. Preliminary Remarks. <i>By W. M.</i>	208
Twenty Minutes Observations on a better Mode of providing for the Poor, &c. &c. <i>By Mr. Richard Pew, F.R.S.E.</i>	219
Remarks on the same, and collateral Subjects continued. <i>By W. M.</i>	238
Letter from Mr. Pew respecting his Pamphlet	249
Letter from the Dean of Gloucester to Dr. Stonhouse, on the same	252
A Plan for the better Maintenance and Regulation of the Parochial Poor. <i>By Thomas Hall, esq.</i>	254
On the Damage of Fir-Plantations, &c. &c. <i>By J. Barnard, esq.</i>	259
On the Subject of the last Article, Planting, &c. <i>By Mr. B. Pryce</i>	264
On the same Subjects. <i>By John Ward, esq.</i>	270
On Shetland or Letland Sheep and Wool, and fineness of Wool. <i>By Mr. J. Thompson</i>	276
On Miscellaneous Topics of Husbandry. <i>By J. Franklen, esq.</i>	283
Extract of a Letter from a Gentleman in Scotland, on Ruta-Baga	291
On Butter-making, and the Author's Pamphlet on Dairying. <i>By Mr. J. Twamley</i>	294
Remarks on Planting, Inclosures, &c. <i>By E. C. esq.</i>	299
On the Culture of Rape, as a Food for Cattle. <i>By Mr. Rawson</i>	307
On the Maple-Sugar of America. <i>By Mr. Clifford</i>	311
Observations on a Tour into Suffolk and Surry. <i>By R. P. Anderdon, esq.</i>	318
On the expediency of sowing Wheat occasionally in the Spring. <i>By Mr. Joseph Wimpey.</i>	334
On the Culture of Potatoes, and feeding Hogs with them, during seven Years. <i>By John Billingsley, esq.</i>	339



## I N T R • O D U C T I O N .

**T**HE usual period of two years having elapsed, this volume was sent to the press, and would have been sooner published, but unforeseen impediments prevented. Since the publication of the fifth volume, the Society has been attentive to the various subjects of publick utility included in its plan.

It will naturally be supposed that a Society which has now existed fifteen years, should frequently take a retrospective view of the state of agriculture, before and since the period of its establishment; and that this great subject should be contemplated in connexion with the growing state of the trade, manufactures, and population of the kingdom:—a population which is generally believed to be rapidly increasing, and which, if so, may fairly be considered as a natural consequence

quence of a flourishing trade, and most extensive commerce. In these respects this empire may be brought into an enviable comparison with the most powerful countries of Europe: and in proportion to its importance, in these points of view, may be considered, under Providence, its internal strength, its security, and its capacity for happiness.

While such considerations animate the breasts of an industrious, benevolent, and brave people, those among them who are possessed of ability, and actuated by benevolence, cannot but feel an increasing solicitude, that agriculture and planting may continue to be aided with all the energy that their augmented importance demands. That the benefits of agriculture, and indeed the absolute necessity of its improvement, are felt more powerfully than ever, is a truth which no other argument than the increasing demand for the necessaries of life, is required to confirm. The landed gentlemen, and those daily enriched by commerce, are now emulous

lous in the study of agriculture; the improvement of poor, waste and barren lands, is become a favourite undertaking; and a laudable enquiry seems to be general, *How the face of the country, according to its local circumstances, can be rendered most productive?* This general enquiry, and the consequent exertions, may in no small degree be imputed to the publick-spirited institutions in the kingdom, among which THE BATH AND WEST OF ENGLAND SOCIETY has the honour of holding no inconsiderable place. The effect of such establishments, though gradual and diffused, has undoubtedly been sure and happy. For under all the circumstances of increased demand, it is an obvious truth that the supply of every necessary, and most of the comforts, of life, is not only abundant, but in general easy of acquisition to the honest and industrious of all descriptions. This augmented supply has been furnished, in some degree, by the increase of lands brought into cultivation; but perhaps far more by improvements in the general system.

Great,



Great, of late years, have those improvements been in the progressive extinction of summer fallows, by means of ameliorating, and at the same time profitable, feeding crops. That it has been an age of speculative, as well as practical, experiment, will be allowed; and the confession may be made without regret. For though individuals may have frequently failed in different projects, the contrary must never be expected in first experiments. It is not in human wisdom to devise at once the means of reaping from all-bountiful nature the fullest produce of her powers. In the present stage of experimental discovery, sundry profitable facts have been ascertained, respecting the relative value of crops, and articles of food for live stock.

Of the publick importance of Mangel-Wurzel, but little expectation is now formed; and while turnip crops, in various situations, will continue to maintain their importance, it seems, from confirmed experience, that large cabbages, carrots, parsnips, turnip-rooted cabbage, ruta-baga, and potatoes, will be found of increasing consequence to the nation.

Of

Of these the ruta-baga, or Swedish turnip, seems at present to be least generally known, tho' with an undoubted prospect of soon becoming not only *well* known, but very highly esteemed for its productive growth, its nutrition, and its hardiness. The seed has hitherto been dear, but may soon be expected much cheaper. And it will be patriotick in gentlemen, and farmers in general, to save as much as they conveniently can for sale the next season.

Of the potatoe, that common but invaluable root, much remains to be considered and proved. Its value to the poor of this country was largely anticipated, by that late eminent and worthy man Dr. JOHN FOTHERGILL; he caused large plantations to be made near London, with a view of ascertaining, and rendering more conspicuous, the vast importance of this formerly humble article. It was not then, or till of late years, supposed by practical farmers in general, that it would soon become an article of immense consequence in field culture, both with a view  
to

to preparing the earth for a fine wheat crop, and as a most abundant supply of food for the live stock of a farm. ' In these different points of view, the papers heretofore published on the subject, in these volumes, may have served to excite a profitable attention; but the masterly experimental memoir, contained in the present volume, from a gentleman to whose exertions and publick spirit his country is largely indebted, will give peculiar satisfaction. From the clear manner in which he has detailed his experiments, and the large scale on which they were made, much may be known and inferred, concerning the uses and advantages of this very important root; and it is not without a hope of national advantage, that the paper in question is recommended to particular attention.

The same gentleman is now voluntarily conducting an experiment, by feeding six sorts of sheep through the current year, in such a manner as to ascertain, as far as such an experiment may do it, the disputed point, *which is the best race of sheep for general stock,*  
*with*

*with regard both to the wool and carcase?* This subject will continue to employ the attention of the Society 'till some determinate facts are ascertained, that may lead to publick conviction. How far the *general improvement of the quality of British wool* is practicable, so as to supersede the necessity of a large foreign supply, is a question agitating elsewhere; and this Society cannot be inattentive to its solution. It might possibly be found that a general national alteration of the stock of sheep, in favour of fine wool, would be incompatible with the national interest, both with respect to the *quantity* of wool and of mutton. Whether the quantity, and consequently the cheapness of mutton, would not be in danger of being sacrificed to fineness of wool; or whether the coarseness of most of our wool, compared with Spanish, be, under all circumstances, an evil; are questions of no small moment. Some gentlemen, of much candour and reflection, will not be disappointed if this Society should ultimately fix in a confirmed opinion, that there is no race of sheep in Britain but what has its advantages,

tages, for particular situations and exposures. We have no wool, however coarse, but what is useful. Our different manufactures for home and foreign trade, require the different sorts already known, consume them all, and even call for more. If it should be found that the present system of artificial feeding, necessary to increase the quantity of mutton, (and which consequently increases wool) is incompatible with a general improvement in the *fineness* of wool, still that increased quantity of human food, a proportionable increase of wool and manure, and the adaptation of sheep to the circumstances of the district, are objects of higher national importance, than a uniform fineness of wool. These points may now be considered as in a fairer train for investigation than heretofore: and the result may be expected at a future day. So long as British genius and advantages for manufacture, on a comparison with those of other European nations, continue what they are, so long must wool of some sort be imported. And the question then will most probably be, *which* may be imported to greatest advantage, that  
which

which is *most*, or that which is *least* compatible with the first of all objects, an improving agriculture? If the *latter* of the two, then it may be deemed a happy circumstance, that that sort is to be imported, which, from its compactness, lies in least room; and which may be paid for, in part at least, by the lighter and coarser manufactured articles made from the combing wool of our own country.

Respecting the volumes now before the publick, it has been suggested by one or more of the Society, that a General Index of the various topics might be found useful. It therefore may become the care of the proper Committee to have such an index furnished in the next volume, if such shall be deemed particularly necessary.

It now remains to invite gentlemen who are in the habit of agricultural experiment, to communicate whatever facts they may ascertain, that are either new in themselves, or which they may deem of a useful tendency in the advancement of knowledge. Such  
favours

favours will be ever thankfully received. And it is presumed that a candour of attention, and a constant regard to the publick interest, will continue to be exercised by the Committees of this Society.

*Bath, July 10, 1792.*



# L E T T E R

.TO THE

## BATH AND WEST OF ENGLAND AGRICULTURE SOCIETY.

### ARTICLE I.

*A Series of Letters on Planting, and the Management  
of Woods, from THOMAS SOUTH, Esq; to the  
Secretary.*

### LETTER I.

SIR,

THE memoirs you obligingly sent hither gratified me exceedingly; they contain an ample fund of Agricultural Experiments; but that grand national object, *the growth of timber*, has hitherto been sparingly treated of. It may not be generally known, that the destruction of Oak, towards the middle of the present century, became so very rapid, as to occasion public enquiry in 1771, the returns\* to which ascertained, *that the*

Vide these Returns in the Commissioners 3d Report, p. 72.



*naval Timber had decreased in quantity within forty or fifty years, then past, to the amazing amount of four-fifths on an average through the kingdom. What an alarming circumstance, to a maritime state like this ! And the misfortune is, that such devastation still continues, both in publick and in private woods. To demonstrate what a heavy loss is sustained by the community, through the imprudence of private owners, I state the following facts.*

The year before last, there were fourscore Oaks felled in this neighbourhood, *whose aggregate contents scarcely exceeded twenty tons ;* and in 1758, a single tree was felled, but a very few miles from the spot, *which contained in itself twenty-eight tons.* The soil where these diminutive sticks were produced, was of a nature equally propitious to the growth of oak, as that of Langley-Wood, and most of them had room to spread in ; consequently such, had they been permitted to remain, would have become Naval Timber. Let what encouragement soever be given to promote private plantations, they must be long in repairing such losses as these. Our modern planters, I fear, pursue the ornamental, more than the useful plan. Oaks, being tardy growers, are seldom propagated ; the silver, spruce, Scotch firs, and other free-growing trees, are preferred

ferred. One ingenious correspondent\* of yours cut down his firs, indeed, for the sake of his oaks; and another for the sake of his beeches.† The planters of oaks and beeches deserve every encouragement, as both find place in Naval Architecture; the latter, if long and strait, serve to plank the bottoms of ships, up to the light water line, equally well with the former, and at less than half the expence. The most successful planter I ever heard of, is your correspondent Mr. Marham. It does not often happen, that men have a taste for such pursuits, at the early age when he began his career; and in the course of things, it as seldom happens, that men attain his patriarchal years. To plant in 1720, and contemplate his improvements in 1790, is an instance scarce to be equalled. May his patriotic endeavours long be crowned with the blessings they deserve! From the publick

\* I think this mode of planting oaks a very good one, as likewise this gentleman's method of rendering crooked saplings strait. Though I profess myself an advocate for rendering strait ones crooked.

† I see no necessity for cutting down all the firs in this case, for the beech would have kept pace with them and flourished, and there cannot be a more ornamental wood than a mixture of firs and beeches, especially on a declivity, the contrasts between the deep green of the one, and the paler hue of the other, form a pleasing object in the summer months. The golden tinge of the latter enriches the scene in autumn, and even when bronzed in the winter, they have no unpleasing effect.

much is expected. Inclosures of forest land, if conducted with propriety, may prevent national ruin; for timber is become scarce on the continent as well as here; the increase of commerce causes such a demand, that it rises in value every where. The scarcity of knees\* and crooks of large dimensions is now severely felt; it is with difficulty the docks get supplied, so that ships are often at a stand for want of them; the king's forests have been productive of many of these most valuable articles, but they are nearly exhausted; and the methods proposed by the surveyors for raising timber in Dean Forest, is by no means likely to remedy the defect. Planters should not only consider what suits their respective soils, but to what uses their timber may be appropriated. The elm ought to be led up tall and strait for keel-pieces, ship's pumps, water-pipes, &c. Arbele, if brought to great length and substance, will make good beams and rafters for barns, cottages, &c.; for this timber, (not being subject to the worm) whilst under thatch that admits no wet, will continue sound above a century. The perfection of ash lies in its being free and tough, properties sought after by

\* So great was the deficiency towards the close of last war, that the old ships intended to keep up appearances only, were ordered to be repaired with ash knees and crooks.

coopers, wheelwrights, and coach-makers. Beech, as a quick grower, repays the planter's toil; it thrives well on chalky hills, and may be trained either to long boles for ship-planking, or to branchy crooks for mill-wheels; it is excellent in water-works of all kinds, for, where constantly kept wet, it is as durable as oak itself; and the present scarcity of that most valuable timber, requires that we should employ every substitute we can in its place. The growers of oak should be most particularly attentive to the situation and demand. In inland countries, where carriage is a drawback, and prevents a profitable communication with the sea, timber, if thinned in due season, cannot be drawn up too fast. The house-carpenter, in situations like this, is the chief purchaser, and strait lengths are his delight. In the maritime counties, a large crook in the bole of a tree doubles its value, and admits it into a dock-yard, when but two-thirds the contents of a strait one. Floor timbers, compass-pieces, knees, &c. are the basis of naval architecture, and cannot be dispensed with; such, when choice and large, carry in much inferior timber with them; and without a due proportion of such, no contract is ever made by the Navy-board, nor can the merchant expect payment for what he has delivered, till the most useful of these articles

have been provided. Wherefore, sooner than lay out of 4 or 5000*l.* for any length of time, he will give more than its value for a lot that suits him. By the third report of the Land Revenue Commissioners, it appears, that there are 18,000 acres of land in Dean Forest, Gloucestershire, designed to be set apart for inclosure, and the growth of oak timber ; but the method proposed by the surveyors is not likely to be productive of such as is most valuable ; thick planting, with timely thinning, may produce strait boles, and, in a suitable soil like this, large and long-lived timber ; but to raise knees and crooks, requires a contrary practice ; which, if the society think it worth their attention, I will endeavour to explain hereafter. In the mean time, have inclosed such particulars respecting the famous Langley-Wood Oak, as may serve to stimulate the possessors of thriving trees, to preserve them carefully till they indicate approaching decay ; whenever that is observable, even though in parks and pleasure grounds, the axe should be applied forthwith ; for it is a waste almost as shameful to leave such a tree as the Colthorp Oak\* to perish, as it is to cut fourscore young ones, to supply the place of one at full growth. It is not the age, but the condition of the tree, however, that

\* See Hunter's edition of Evelyn's *Silva*.

should

should determine its fate ; in some soils the oak never vegetates freely, becomes stunted and dead-topped in its 50th or 60th year ; to let such stand, even though of ten feet meetings only, is folly ; and to cut thriving trees of meetings so very small, is madness in the extreme. It is, when of this size, that they begin to pay best for standing ; they then yearly improve both in quantity and quality of their contents ; the blee lessens as the spine increases ; the arms become measureable one after the other, and though the body may not increase in circumference quite so much annually\*, as it had done when younger ; the length and bulk of the limbs will add considerably to the contents and value of the timber. If this, Sir, should prove acceptable to the gentlemen of the society, I have minutes of another famous oak, measured twice by myself, and can trace, I think, the rate at which it proceeded.

I am, Sir, your very humble Servant,

*Bosington, Hants,*

T. SOUTH.

*Oct. 2, 1790.*

\* That accurate observer, Mr. Marsham, finds that oaks do not in the second century increase so much annually in circumference, as they did in the first ; notwithstanding which, they increase much more in solid contents yearly, as I am prepared to demonstrate.

*Dimensions of an Oak felled in the Year 1758, in  
Langley Wood, belonging to the Bishop of Salisbury,  
upon the Verge of the New Forest.*

THIS tree stood singly in the wood, and extended its massive branches near forty feet each way. Its head was all knees and crooks, aptly suited to naval purposes; its bole or shaft was short, not exceeding twenty feet in length, but was full six feet in diameter at the top, and perfectly sound; it was felled in an unusual manner for the preservation of its crooks, which were cut off one by one, whilst the tree was standing, and lowered by tackles to prevent their breaking. The two largest arms were sawed off at such distances from the bole, as to make the most capital first-rate knees; scaffolds were then erected, and two pit-saws being braced together, the body was first cut across half through at the bottom, and then sawed down the middle perpendicularly, between the two stumps of arms that had been left; at the end of one of which, stood a perpendicular bough, bigger than most timber trees; to prevent this being injured, a bed was made of some hundreds of faggots to catch it when it fell. This half was so weighty, that it crushed a new timber carriage to pieces, the instant  
it

it was lodged upon it ; and none in the country being found strong enough, the king's carriage was sent purposely from Portsmouth to convey it to the dock-yard. It was drawn in general by twelve horses, assisted occasionally by eight others. The drivers were obliged to find the most level ground, and instead of drawing it to Portsmouth, as was intended, made the shortest way across the forest to the sea-side.

This tree was sold in the first place for forty pounds ; was bought of that purchaser by the late Mr. White, of Anville, timber-merchant, for an hundred pounds, who is supposed to have cleared an hundred pounds more ; which he possibly might do, for the contents, as I was informed a few years since on the spot, amounted to thirty-two loads of hewed timber, which at half a crown a foot, no unusual price for naval crooks amounts to 200l. precisely, besides faggots, &c. sufficient to defray the expences.

N. B. Having transmitted this account (through the medium of a friend) to Mr. Marsham, he obligingly returned me the annexed particulars, in the sum of which, he seems to fall short of the quantity I have stated ; but this is easily reconciled ;



ciled; his admeasurements being manifestly taken (by a country carpenter) in round timber, and mine from the marks when squared, which would make twenty-eight tons, equal to thirty-two loads at least.

*Measures of the Oak in Langley Wood, felled by Dr. Thomas bishop of Sarum, in 1758.*

Pieces	Length Feet.	Inches Girt.	Contents in Cubic feet.	Tons.	Hogf head	Fect.
Body	20	54	405	10	0	5
Limbs.			-			
1st.	30	23	110	2	3	0
2d.	23	19½	60½	1	2	0½
3d.	24	19	60	1	2	0
4th.	28	19½	74	1	3	4
5th.	28	22	94	2	1	4
6th.	20	17	40	1	0	0
7th.	19	13½	24	0	2	4
8th.	23	11½	21	0	2	1
9th.	23	15	35	0	3	5
10th.	13	18	29	0	2	9
11th.	26	13	30½	0	3	½
12th.	20	10½	15	0	1	5
13th.	16	14½	23½	0	2	3½
14th.	25	12	25	0	2	5
			1045½	26	0	6½

There were besides in several small pieces of useful stuff for the navy, 74 feet; so in all 28 tons.

The breadth of the tree across (near the ground) where it was cut, was twelve feet, and had above 300 rings of annual growth.

These

These measures were given to Mr. Marsham, of Stratton in Suffolk, by Mr. Fellows, of Shottisham, Norfolk, brother to Mrs. Eyre of Newhouse, whose carpenter took them by her order.

The account of felling, Mr. Marsham acquaints my friend was nearly the same as above.

## LETTER II.

### *On the Growth of Elms.*

SIR,

**T**HE elm delights in a rich black mould, where it attains its largest size. It thrives well, and produces the toughest and best timber in a hazely loam. It will grow on gravel, but disgraces chalk, and detests morass.

It requires an open space, and much room for its roots to spread in ; if confined in groves, it deceives the planter ; the borderers only arrive at perfection, whilst those near the centre, though straight, are weak ; and if through imprudence the large protective trees be cut down, the remainder, instead of improving, become dotards ; for being relieved from the dense atmosphere, which had forced all  
the

the sap the root could imbibe to the upper extremities for vent, their shafts break out into innumerable sprays, that exhaust the sap before it reaches the top, which consequently perishes for want of supply.

These trees should therefore be either planted single, in small clumps, or in hedge-rows. The latter is the most profitable method, as the suckers which spring from the roots will, under the protection of the hedge, furnish a continued succession.

I have heard of elms containing twelve tons round measure; some of my own are three, one, I believe, six or more; and I remember *one*, for which its owner refused *twelve guineas*. This was the majestick ornament of a pleasure-ground. Its shaft was fifty feet in length, without spray or blemish; viewed at a distance, it made the finest may-pole that ever eyes beheld, having a round head like a garland at the top. It has been since fallen, but what it fold for, or whither it went, I cannot say; though probably to the dock-yard, being fit for a keel of the first magnitude. On sight of this tree, it evidently appeared to have been as much indebted to art as nature for the elegance of its form; and as it grew opposite to the centre of a gentleman's

man's house, I concluded that the gardener who planted, had, with unremitted diligence, attended to its improvement, till trained towards the perfection it at length arrived at.

There is now standing on a knoll, in a meadow of mine, an elm which *was possessed* of great beauty likewise, though of a different kind; the bole of it, which is only eight feet long, was, in 1766, ten feet and a half in circumference at three\* feet from the ground. Its branches formed a conoid, whose diameter at the base was one and twenty yards. It continued growing in this form till the memorable hurricane on Shrove-Tuesday, 1781, which tore off the lower limbs, and spoiled the regularity of its shape; thus mutilated, it weathered the storm, which blew down and broke to shivers seventy others, some of which were four tons apiece. Cruel loss! But why should I lament? The same storm that overthrew the timber, purified the air from noxious vapours, and might thus preserve the life of its proprietor. This tree, notwithstanding its having been so much dismembered, measures, in 1790, thirteen feet six inches in circumference, at

\* This was then the smallest part of the bole, and is measured from the highest ground, it being four feet and upwards on the lower side.

the same height from the ground, having gained thirty-six inches in twenty-four years, *i. e.* an inch and a half annual increase. The amount of the contents, in the small compafs between the branches and the ground, is amazing, for eight feet by  $40\frac{1}{4}$  inches girt is equal to 100 feet, or two tons and a half of round timber. The upper part of the shaft and the remaining branches are large, so that I cannot estimate it at less in the whole than six tons; but it is not of half the value as if the contents had been in one continued shaft. This stick, though now forming a new and not ungraceful head, must, upon the principle before laid down, be fallen within these twenty years, or it will rot internally by wet admitted through the stumps of the branches.

No person having yet anticipated what may be further said on this subject, I shall proceed to lay all the plain facts I am master of before the Society, and conclude with observations, resulting from such growths as have been particularly noticed by myself.

In 1738, an avenue of above seventy elms was planted in double ranks by my predecessor, in the front of this house, the summits of their branches are at present sixty feet or upwards. Those in the

rows

rows next the sun are from seven feet to six, whilst those in the northern rows, though of the same height, are only from six to three feet and a half in circumference. One particular tree in the best aspect near the house, in 1770, measured four feet in circumference at four feet from the ground. Its present admeasurement is seven feet six inches, *i. e.* a yearly increase of above two inches. This is a rapid growth indeed, but is thus accounted for. It obtained more room on cutting down its neighbour, which overhung the house, and the root of that being grubbed up, the earth was loosened a great way round, and fresh mould added to preserve the level. The tree in consequence put out large branches, following the roots in that direction.

A single row of trees planted in the same soil, and at the same time, are of equal height, but of increased bulk; these are from eight feet two inches, to seven feet in circumference, at the same distance from the ground, and contain on an average almost double the timber, *viz.* some of them near two tons.

In 1766, I planted three hundred elms, some single, others in clumps, the remainder in hedges, and in the two following years, filled up the vacancies caused by failure. One of the single trees  
is

is now three feet four inches and a half in circumference,\* the shaft is about twelve feet long, and the head proceeds in four equal upright branches.

The next largest is also a single tree, having a long straight shaft near thirty feet to a bough, and upwards of forty feet to the summit of its branches, its circumference is two feet eight inches only. But the timber of this tree will, from its length and straightness, yield double the price of that of the other hereafter.

Those in the clumps keep pace with this in height, but do not equal it in bulk.

Those in the hedge-rows were of different sorts, the best of them came from a nursery at Southampton, and are now about the size of those in the clumps; the others from Salisbury; these did not from the first appear to have been free growers, and the longer they stand, the further they will be behind their competitors. All these have thrown out numerous suckers from their roots, so that where one hundred and fifty only were planted, there are

\* N. B. The circumference of all these was taken at four feet from the ground.

now five hundred at least. N. B. Some of the offspring of the Salisbury trees, promise to be timber before their parental stocks.

Elms may be raised by protection only ; for the stool of a timber-tree when fallen, will throw up many suckers ; fence these round with rough railing, and in eight or ten years they will be out of danger of cattle. They at first proceed slowly, but if duly thinned, and trained properly, will make good trees. The way to thin them to advantage, is to dig deep amongst them the year before ; cutting off the roots of the weakest, which causes them to throw out fresh fibres, and fits them for removal. About six years ago, my gardener trenched a piece of useless ground behind some cottages, and planted it with refuse suckers thus prepared. The poor people availed themselves of the circumstances, set the ground with beans and potatoes, and have continued to crop it ever since. This has been of service to them, and of infinite benefit to the trees ; which by means of this annual culture, have far outstript their undisturbed brethren, and almost double their contents.

The suckers adhering to old stools, do not keep pace with maiden trees planted of the same size :



the reason is obvious ; the roots they throw out are for a long while confined to a soil already exhausted by a like production, which checks their progress. If the ground between them were to be dug once a year, and a few barrows of very rotten dung\* turned in for two or three years successively, I doubt not but they would pay by the quickness of their growth ; but it is an experiment I have not tried.

The suckers which arise from my young trees in the hedge-rows, grow faster than new-planted maiden trees of the same size, having fresh mould to root in, and receiving at the same time, some nourishment from the parental stock. The planting elms in hedge-rows is nevertheless in some respects objectionable, for the tenant in general thinks himself intitled to their shrouds, which he lops in a slovenly manner, at such time as he deems most profitable, *viz.* every twelve or fourteen years. The faggots are then an object of some consequence, as well as the relief he gives to his pastures and crops. But the misfortune is, that the wounds he makes are too large to heal over ; the knots become turgid, instead of smooth, admit water, and injure the timber. To prevent this, they should

\* Mr. Marham's famous oak, of his own planting, has been much forwarded by digging round and manuring it.

be trained for the first thirty years with circumspection. By repeated trimmings at short periods, the shafts will be rendered clean and unproductive of sprays, and the heads reduced into a narrow compass, and at such a height from the ground, as neither to annoy the crops, or sour the grafts by shade.

In consequence of a doubt being started, whether the shaft of a tree lengthens inch by inch through its whole extent, or only by the addition of new wood to the top;—in March, 1786, after trimming up three young elms, I shortened the underbough that was left in each, and dropt a line and plummet to the ground. The length of the shaft, No. I. was twenty-seven; of No. II. twenty-eight; of No. III. thirty feet; at which lengths I opened the strands of the line, and inserted a mark of red tape, put it carefully by till March 1790, when trimming the trees afresh, as is my constant practice every fourth year, the line, when applied with its marks to the foot of the same branch in each tree respectively, held the plummet suspended above the ground, and proved an uniform advance in length of their shafts, from eight to ten inches; the shortest having gained the least, the longest the most, *viz.* two inches and a half in a year.

*Observations and Conclusions drawn from the preceding Premises.*

1<sup>st</sup>. As the growth of Elm bears proportion to the extent of ground allotted for its roots to range in ; those who would propagate large timber, must never plant too close.

2<sup>dly</sup>. That though branchy elms are the quickest growers\*, they are not the most profitable to the planter ; for such timber is little sought after, and one branch only being accepted by the merchant as timber, the rest all go with the top, which reduces the contents exceedingly.

3<sup>dly</sup>. That as the value of this timber consists more in the length and bulk of the shaft, than in

\* That branchy trees are the quickest growers, I believe to be invariably the case, and may be thus accounted for : the sap inhibited by the roots, is a compound of aqueous and nutritious matter ; the quicker it is in its passage, the greater is the demand upon the roots, which extend themselves accordingly in search of fresh supplies ; the branches follow their direction, and still increase the demand ; and the more branches a tree has, and the nearer they are to the ground, the sooner the sap perspires off its aqueous particles, depositing the nutritious ones by the way. Wherefore the timber is more amply fed by an accelerated current of sap, than by a tardy one, consequently branchy timber increases more in proportion, than that which is clean shafted, where the sap is longer in its progress, finding no outlet till it reaches the top.

the crooks and contents of its branches, it is the business of planters to train them up tall and straight, to keep their shafts clean, and not to suffer them to branch till within a few feet of the top.

*4thly.* The present method of lopping, though conducive to the lengthening of the shaft, fills it full of rough protuberances, which, by admitting water, are very prejudicial to the timber, and occasion the defects so generally complained of.

*5thly.* The shaft of the elm advances inch by inch through its whole contents, that is, every inch lengthens yearly; by this means it advances more or less in proportion to its length, besides the addition of new wood at the top; so that a branch now thirty feet from the ground, will (in a growing stick) five years hence be removed higher by a foot, consequently the timber is increasing in length beneath that branch, as well as above it.

*Lastly.* The growth of elm is to that of oak, in a hazely loam like mine, as three to two, and the value of the timber, if long and straight, as two to three. The profits of the planter, therefore, both in oak and elm, will be nearly on an equality.

*To train up Elms to long straight Shafts.*

Care should be taken in planting, to shorten all the side-shoots, and leave the leading shoot intire.

In three or four years afterwards, cut the lowermost of the shortened shoots clean off, and shorten most of the maiden shoots above them, carefully preserving the leading shoot, and prevent its having a competitor; at Midsummer following, strip off all such sprays as have put forth from the sides of the wounds (by hand.)

Proceed in this manner every three or four years, cleansing about four feet of the stem at a time, -shortening the upper branches, cutting off close those which were shortened at the preceding trimming, and stripping afresh at Midsummer, till thirty or forty feet of shaft is obtained without spray or blemish; they may then be left to themselves, for the shaft will lengthen some feet, and should they put out more sprays from the lips of the old wounds, such may be stripped off by hand, from time to time, till this vicious inclination ceases. Beautiful and valuable timber will be thus obtained at a very trifling expence, which the pea-sticks that come off will nearly defray.

The advantage that arises from shortening some of the maiden shoots at every trimming, consists in checking their growth; which causes them to be small at the base, in proportion to the bole of the tree\*; consequently the wounds are but trifling, soon heal over, and the bark becomes smooth. It is adviseable to prevent these trees from forking at the top as long as possible, for they are very apt to break off at the forks which injures the timber.

*Bosington, Oct. 25, 1790.*

### LETTER III.

ABELE.

SIR,

THE rapid growth of this timber having been already ascertained by a former correspondent, I have little to add, save that not being subject to the ravages of the worm, it is applicable to more useful purposes than that gentleman has assigned to it†. After the storm in 1781, which not only blew down my elms, but my barns likewise, I rebuilt one of five bays, and twenty-four feet

\* I scarce need say that bole and shaft are synonymous terms.

† I think Abele must be too spongy for the turner.

long in the beams, and roofed it intirely with this timber; and from the experience of others, together with the present appearance of beams, rafters, &c. have reason to think that my grand-children will not find fault with it. In an out-house roofed at the same time with elm, there are manifest signs of the worm already, which will in the end destroy it. But let it not be understood, that I recommend the use of abele under any covering but thatch, which if not suffered to gully into holes will always protect it from wet, on which alone the durability of the timber depends; the drippings from a broken tile, slate, &c. cause it soon to perish.

These trees are often subject to warty excrescences, which, when large, imbibe moisture, and bring on decay. Whilst the plants are young, they do little injury, yet it is adviseable to root up such as are much disfigured with them, to give room to those which are healthy. I have some of the true Abele or *Populus Alba*, which are now forty feet long in the shaft, and six feet four inches in circumference at five feet from the ground; their exact age I do not know, but their contents exceed two tons of timber each, and I judge them to be fifty years old.

The

The species your correspondent mentions, (as received under the denomination of the Dutch Beech) surpasses them in quickness of growth. But I much suspect that his trees are very branchy.

•  
ALDER,

As patten-makers timber merits little regard, but being the most beautiful of the whole aquatic tribe, is extremely ornamental along the banks of serpentine rivulets, or planted as single trees in springy gravels, or peaty bogs, where little else will grow. Placed in a border round abeles, the latter run above them, and form a pleasing contrast.

From the authority of great masters in their way, Miller, Mortimer, &c. I was induced to plant a waggon-load of truncheons, in the year 1764, in situations above described. I was flattered the next summer with every prospect of success, their shoots being strong and gross, but lo ! the year following, one and all perished, not having struck a single root. Being satisfied that this could not be owing to a defect in the soil, I replanted the same in 1766, with small-rooted slips taken from old stubs, few of which failed ; most of them have been cut twice for brush-wood, poles, &c. and of those planted single, one has formed a conical top of great beauty,  
and



and its bole is three feet seven inches in circumference, midway between the branches and the ground.

Mr. Miller recommends this timber as excellent in water-works, but I can say nothing of its merits myself, having never tried it. When charred it makes the best coal for gunpowder.

### ASH.

The growth of ash in soils adapted to its nature, is little inferior to that of elm or beech.\* But there is no timber whatsoever that differs more in its value than this does, according to its situation. The productions of dry and healthy ground (unimpaired by the farmer's bill-hook) will prove acceptable to most purchasers. Those of woods are generally clean in the shaft, free-cleft, and more valuable than the former. The nearer the ground, the tougher is the timber, the shaft therefore is coveted, the brittle branch rejected.†

If these trees are removed when ten or twelve feet high, their grain acquires a degree of tenacity

\* Vide p. 445, Society's Mem. vol. 5.

† The buyers of this timber accept the shaft and its continuation, or best bough; the rest, be they ever so large, go with the top.

very prejudicial to the timber. My predecessor, about the year 1750, planted a row of them in a place since converted into a garden. Their shafts were apparently so clean, as to engage a cooper's notice, who purchased them at a good price, *viz.* 36s. per ton, but told me afterwards, they were clung, and did not answer his purpose,\* so he re-sold them to a country carpenter at a loss. One of these trees, which was left standing, measures now four feet eight inches in circumference at four feet from the ground.

Ash timber, when raised in damp meadows, or moorish soils, becomes light, spongy, brittle, and of small value, in comparison of that on dry and healthy spots. In meadows, they will attain a size † which cannot be expected in moors and bogs; for when the roots reach the peat, the bark grows mossy, and the top decays; how long stubs may be productive of poles, in such situations, remains

\* i. e. They would not cleave into hoops. *Clung*—a provincial term, signifying that the grain adheres too closely to separate freely.

† An ash in my mill mead, which in 1760 contained 34 feet of timber, being apparently at a stand, was felled last spring, and then measured 60 feet, *viz.* an increase of 26 feet in thirty years. It was a fine butt to look at, but was estimated at no more than 25s. per ton. N. B. The top had been decaying, and the growth stagnated for five or six years past.

to be determined, but experience convinces me, that ash, thus planted, will never become timber of any value, as the roots must perish before the tree arrives to perfection.

Ash trees in dairy plots are nuisances, as their leaves make the butter rancid and worthless; mixed with beeches in an open grove, they run to great lengths, are free-cleft, and make valuable timber. Coach-makers, wheelwrights, &c. like the shafts when a little bent, more than when perfectly straight. The cooper has no objection to the latter.

#### BEECH.

The propagation of Beech is strongly to be recommended as a free-grower, and applicable to many useful purposes. It saves oak (as before mentioned) in planking ships bottoms, and in ringing mill-wheels; its close grain and firm texture render it unparalleled in water-works of all kinds, for when constantly kept wet, it appears as perfectly sound at forty years end,\* as when first immersed. The mortices and tenents chafed by the influx and eflux of water will in time be the

\* Of this I have had frequent proof, having known the same beechen cell, when turned, and fresh morticed, last two wiers, and found enough afterwards to make the plating of an outhouse.

one enlarged, and the other diminished, but the wear in this timber is nothing like so great as that in elm; wherefore head-cells in mill races, wiers, &c. should be of beech, in preference to any timber whatsoever; and, as the very offal is the most valuable cleft-wood, yielding a guinea a cord to the malster, there are few trees more profitable to the planter in countries where there is a demand for it. The beech is the chief ornament of the Cheltenham hills in Buckinghamshire, and of the Horse-shoe hills in this county. It delights in chalky soils and lofty situations; it is more profitable in open groves or mingled with ash, than in coppices of underwood; it runs up in the former with a long clean shaft, it branches in the latter to the destruction of all around it.\* Yet both length of shaft and branchy crooks have in this timber their respective values for the purposes above-noticed, which makes me wonder, that the timber bears no greater price than from 6d. to 8d. a foot, whilst elm fetches 10d. and a shilling.† I have many beeches of large sizes

\* N. B. Nothing but holly will grow under the drip of beech, (truffles only excepted.)

† Notwithstanding the body of the beech, however clean, fetches a price inferior to straight elm, yet the limbs and offal are worth more than those of elm, and there is a difference of measure which brings them nearly to a par in price, for the buyer claims an allowance of an inch in a foot girt, on account of the roughness and thickness

size, and great beauty ; one that has been measured repeatedly was, at Midsummer 1769, six feet two inches and a half in circumference, at five feet from the ground\*, and at Midsummer last, was eight feet, seven inches and a half, viz. it increased twenty-nine inches in twenty-one years, being above one inch and one third yearly. The shaft of this tree is about forty feet long, as straight as an arrow, it breaks all round into small branches, and contains between two and three tons of timber.

ness of the bark in the latter, but claims no deduction for the smooth bark of the former ; another consideration for the planter is, that elm requires a soil worth 20s. per acre, whilst the beech will grow in white land, scarce worth 7s. per acre.

\* That is, five feet on the lower side, or four feet on the upper. Query, What will be the contents of this tree at 24 years end, after the same rate of growth ?—A shaft tapering regularly from a circumference of 8 feet 8 inches at its base, to four feet at its summit, will girt 19 inches in the middle ; for the girt at top 12 inches, added to the girt at bottom 26 inches, are equal to 38, which divided by 2, are equal to 19 inches the girt midway ; and 40 feet by 19 girt, are equal to 100 feet of timber, its present supposed content. Then at 24 years end, allowing an inch only in a year for the extension of the shaft in length, it will have gained two feet additional length, and 24 times one inch  $\frac{1}{2}$ , are equal to 32 inches, equal to 8 inches girt, added to its present measure 19 inches, are equal to 27 inches ; then 42 feet by 27 inches, are equal to 212 feet, seven inches ; so that in 24 years it will gain 112 feet, viz. it will more than double its present contents, which it has been sixty years at least in attaining.—May this prove an incitement to those who have thriving trees, to preserve them, till they have apparently done growing !

In the year 1768, I planted some hundreds of young trees in single and double rows along the side of chalky hills. These are now thirty feet high, and in circumference from eighteen to twenty inches at four feet from the ground; they were originally drawn from the woods from three to four feet high, and a general failure being prognosticated by unsuccessful beech-planters, I placed them thicker than I would have done, and planted them alternately, the best at full length, and the worst cut down to the lowest eye, which was left even with the surface of the ground; there were not one in an hundred of the former which lived, nor one in a hundred of the latter which failed. An upright growth of thirty feet, in two and twenty years, in a poor shallow soil, is as much as could be expected; they would have increased faster in bulk, if they had been permitted to have spread; but my design being to draw them into long shafts, they were frequently trimmed for that purpose, and promise to make fine trees hereafter.

N. B. Beeches may be trained to long straight shafts, after the manner of elms, with this difference only—that a spray must be left near the end of every shortened branch to keep it alive, otherwise it perishes, and becomes a faulty knot.

Beeches

Beeches are the worst neighbours oaks can have, they grow so much faster, and extend their roots so far as to weaken, if not starve them. When the former overhangs the latter, that assuredly dwindles, becomes dead topped, and worthless.

### FIR.

Though I do not think the Scotch Fir in this country can ever equal the Yellow Deal from the Baltick, yet it may be worth propagating, as of useful purpose in ordinary buildings. The drier the ground on which this timber grows, the slower is its progress, but the closer are its pores, and the more superior its quality.\* When planted in rich land, these trees will shoot three or four feet in a season, and equal, if not surpass the oaks in growth. My plantations, though chiefly confined to chalky banks, in a north-west exposure, evince, that when once rooted, few obstacles will prevent a profitable progress. From observing the mistakes of others in endeavouring to ornament their naked downs too suddenly, I learnt the necessity of planting firs, when a foot high only, and by opening the ground some time before, inverting the turf at the bottom of the holes, and throwing the mould upon it in hillocks,\*

\* I should imagine, that the firs planted by Mr. Allen, near Claverton Down, will prove very fine timber hereafter.

to meliorate, my plantation succeeded well; for though the soil is scarcely six inches deep, the firs, set in 1766, are now thirty feet high, and from two feet six inches to two feet in circumference, at four feet from the ground; some few planted at the same time, in a deeper soil, and warmer situation, are now above three feet round.

Spruce firs planted in 1766, likewise in a tolerable good soil, are now forty feet high, and from two feet ten inches and a half to three feet round.

I have seen plantations which far surpass either of these in growth, but they occupied ground infinitely more valuable.

Yours, &c.

T. SOUTH.



#### LETTER IV.

*Description of Fyfields Oak, now standing in a Wood near Romsey in the County of Southampton.*

SIR,

**T**HIS tree, in 1788, was ten feet eleven inches, and is now nearly eleven feet one inch in circumference, at six feet from the ground.



It is in height to the first live branch	feet	inc.
	21	6
From thence upwards, to where the bole lessens suddenly, is at least an equal distance,	21	6
Thus far it diminishes gradually, like the massive shaft of a Doric column. The continuation of the bole extends near 12 feet farther ; and by comparing it with a tree at hand, it appeared to be 5 feet in circumference, and at the height of 50 feet from the ground	-	-
	12	0
Length of the bole	-	-
	55	0
	or more.	

The very top branches are timber, the tree appears to be in a growing state, and though tradition says it is 150 years of age, its yearly increase is little (if any thing) less than an inch, and the best judges allow it to contain twelve loads of timber at least.

From these given premises, I will endeavour to lay down a sketch of its progress during the latter half of its existence, in order to demonstrate that oak-timber will pay its possessor good interest for standing till it arrives at maturity. But in so doing, I must deviate from the true form of the upper branches, (because it would be difficult to calculate their

their real progress, without measuring them) and imagine the head to be divided into four equal ones ; for the purposes of proving, in the first place, the impossibility of their being timber at the outset of the calculation, and in the second, that they will continue to bear their proportion to the increase of the shaft ; which I shall attempt in a manner so plain and simple as to be intelligible to the common farmer.

It will be allowed, I presume, that an oak, in a good soil and situation, may, at 75 years from the acorn, have acquired 40 feet length of shaft, being 14 inches girt at the base,\* 12 in the middle, and 10 inches at the top. Suppose this terminating in four equal branches, then it is manifest, that none of these branches can be measurable timber at this time ;† for their aggregate contents at the base cannot exceed the simple content of the top of the shaft, which is under 12 inches girt.

The measure of such an oak will be a ton, and its value, as being under naval size, three pounds at the most.

\* What is called the girt of timber, is one-fourth part of its circumference.

† Oak timber is measurable as far as it holds six inches girt, and no farther.

Then, in a moderate way of growth, it will increase one inch in circumference, being one quarter of an inch girt yearly; and as it is found by experiment, that a shaft of elm, thirty feet long, extends itself ten inches in four years, we may at least allow an inch a year for such extension in a shaft of oak of forty feet. It follows then, that at the end of twelve years, when eighty-seven years of age, the shaft will be a foot longer, and having increased in girt three inches, it will measure forty feet in length by fifteen inches girt, equal to sixty-four feet nine parts, the content whereof will be one ton, twenty-four feet, nine parts. As the shaft is now increased to more than twelve inches square at the top, the four branches will begin to be measurable at the base.

In the next twelve years, at 99 years of age, proceeding at the same rate, it will have acquired another foot additional length of shaft, and three inches increased girt; and will measure as follows, *viz.* 42 feet by 18 inches girt, (equal to 94 feet 6 inches) the content whereof is 2 tons, 14 feet, 6 in. and the four branches will be measurable timber to the length of two feet each, and their contents, if seven inches and a half girt, will be 2 tons, 17 feet, 7 inches.

In

In the next twelve years, (at 111 years of age) a third foot is added to the length of the shaft, and it becomes 21 inches girt; its contents then will be 3 tons, 11 feet, 8 inches, and the four branches will become measurable, four feet in length, and girt nine inches, consequently will contain 3 tons, 20 feet, 8 inches.

The next twelve years, (when 123 years of age) by acquiring another foot of shaft, with a girt increased to 24 inches, it will contain 4 tons, 16 feet, and the four branches will be measurable, six feet in length, at 10 inches girt, containing 16 f. 8 in. making in all 4 tons, 32 feet, 8 inches.

We will now allow 13 years for a like addition to the length and girt of the shaft, which (at 136 years of age) will then be 45 feet by 27 inches, equal to 5 tons, 27 feet, 9 inches; the four branches will be measurable nine feet in length, and girt 11 inches, equal to 30 feet, 4 inches; together will containing 6 tons, 18 feet, 1 inch.

Lastly, we will take 14 years to supply an additional foot to the length, and three additional inches to the girt of the shaft; which will then be 46 feet long by 30 inches girt, equal to seven tons,

seven feet, and the four branches will become measurable, 12 feet in length, and girt 12 inches, equal to 1 ton, 8 inches ; and the whole contents (at 150 years of age) will be equal to 8 tons 15 feet, round measure, *viz.* 12 loads of square timber, value 48*l.* to 50*l.*\*

The growth of this capital stick, being thus traced without exaggeration, it may serve to shew the manifest disadvantage of cutting young trees in foils which will bring them to maturity.— Its first 75 years were spent in acquiring a single ton ; whereas, the last 75 years produced above seven times as much in quantity, besides the increase of value as naval timber ; which taken together will pay its proprietor compound interest at 3*l.* 15*s.* per cent. for the latter period ; and who can lay out money to so great advantage, considering the fluctuation of the stocks in the first place, (lucky hits only excepted) and the irregularity of the payments of interest, and the instability of private securities?

\* A ton of round was always reckoned equal to a load and a quarter of square timber, but the hewers now manage their business so dexterously, as to bring it equal to a load and half. Thus the surveyors of Dean Forest estimate 14,400 tons, girt measure, to amount to 21,600 loads, square measure, and value it at 4*l.* per load. Vide Commissioners' third Report.

By Smart's Tables it appears,

That the amount of 1l. in 75 yrs. at 4 p. cent. compound interest,

is  $\text{£.Decimal pts.}$   
 $\text{is } - - - - - = 18,9452,5466$

And in sametime at  $3\frac{1}{2}$  p. ct.  $= 13,1985,5083$  which added together,  
 and divided by 2

quotes  $- \quad \quad \quad 2) 32,1438,0504$

The amount of 1l. for 75 }  
 years at 3l. 15s. per ct. }  $\text{£.16,0719,0252}$

Which multiplied by  $- - - - - 3$  The value of the tree at  
 the commencement }  $\text{£.48,2157,0756}$  { the amount of 3l. in 75 ys.  
 of the term, produces } at 3l. 15s. compd. interest

Mr. Marfham, for whose opinion I have a great veneration, observes, that trees which increase one inch and a half per annum in circumference, during the first century, do not gain so much in circumference in the second. Though I allow this to be the case, it will appear, that they increase more in their solid contents notwithstanding.

In proof whereof,

Take the difference between  $\text{ft. in.}$  131 8 the contents of the shaft in its hundredth year, and  $- - 94 6$  its contents in preceding period,

and divide it by the No. of yrs 12 ) 37 2 (quotes 3f. 1 inch for its annual increase,

3 1

between the 87th and the 100th year of its growth. Then take the difference between  $- 287 0$  the contents of the shaft in its 150th year, and  $- - - 227 9$  its contents in the period immediately preceding,

and divide by the No. of yrs. 14 ) 59 3 (4 f.  $2\frac{1}{3}$  inches.

33

5

Shews, that notwithstanding its annual increase in circumference was diminished, yet the annual increase of its solid contents was greater by one foot one inch and  $\frac{1}{3}$ , from the 135th to the 150th year of its growth, than it was between the 87th and the 100th year, besides the increased measure of its limbs not taken into consideration.

Were an accurate register to be kept of the growth of oaks for 150 years together, (as an ingenious correspondent has wished) we should then be at a certainty respecting it; and not depend upon conjecture, as in the present instance; but in which there being no intention to deceive, and the inferences being fairly drawn from known circumstances, the conclusion cannot deviate widely from the truth.

As the obviating objections is preferable to the answering them, and the increase of the branches may, to persons little conversant in timber, appear in this calculation far too great; I think it necessary to explain the principles on which I proceeded.

It is evident, that the contents of the limbs, be their number more or less, amount in the whole to the quantity of timber the shaft would have contained,

contained, had it extended itself upwards to the length the branches are measurable. The four imaginary ones that I have adopted, therefore, may be considered as a continuation of the shaft to the extent of 12 feet. Then,

As the top of the shaft in its 75th year was equal to 10 feet girt ; in its 99th year, by the addition of one-fourth of an inch yearly, it will girt 16 inches in that place ; lessening in its advances towards the top, which is supposed to have gained two feet ; this at 15 inches girt is equal to three feet one inch.

In its 111th year, the same part of the shaft will be 19 inches girt ; and four feet the supposed length of additional timber will be equal to nine feet, as the mid-girt will be 18 inches only.

In the next period, the girt at the same place will be 22 inches. This, if continued six feet, at 20 inches only in the girting-place, is equal to 16 feet eight inches.

To proceed : the old top of the shaft now takes 13 years to increase to 25 inches, and its advanced  
length



length 9 feet, will, at  $22 \frac{1}{4}$  inches girt, be equal to 30 feet 4 inches; and

Lastly, the said top increases to 28 inches girt, and the additional length of timber, being 12 feet at 24 inches girt, equal to one ton eight feet, set down as the measure of the branches; which, it may be observed, are here supposed to lengthen more than in proportion to a foot in a period, though the shaft was confined to that extent; as in fact branches when they become timber, always do. For being of great length, before they attain measurable substance; upon their increase in bulk, the mensuration extends as rapidly at least, as the progress here assigned to it; viz. from two to three feet in 12 or 14 years. Thus large branches in oak, contribute greatly to the increase and value of the timber, as is evident by that of Langley-Wood.

In the manor of Dibden, belonging to Lord Malmesbury, on the eastern bounds of the New Forest, are some capital oaks; one in particular is larger than Fyfields at equal distance from the ground, but inferior to it in height and solid contents. This is 11 feet eight inches round; at six feet the shaft is straight, and exceeds 30 feet in length;

length ; it has four or five large branches, and may contain about eight loads of timber. A lower limb or two has been mutilated, yet the tree is at present sound, but seems nearly at its best.

The three instances of well-grown oaks before stated are enough to shew the advantage accruing to their owners, and the community in general, by refraining from cutting trees whilst thriving. Those who would seek for more, and are within reasonable distance, I would refer to Longleat ; where there are many objects of this kind, of sufficient grandeur to excite their emulation. May the noble possessor long enjoy the pleasure of setting such an example of forbearance ; and may his lordship leave it in charge with his descendants, to add even to the oaks he has brought to such perfection, and reserve them to naval purposes on the first apparent indication of decay ; by no means suffering such valuable productions to moulder away in burly deformity, millennial monuments of their owner's folly, from generation to generation hereafter !

Of such, there are too many at this time extant ; the Cawthorp Oak, though a magnificent ruin, with the Greendale Oak delineated in Hunter's edition of Evelyn's *Sylva*, and Bull-oaks, in various

various places, are of this number. The latter are thus denominated, from the no uncommon circumstance of bulls taking shelter within them, which these animals effect, not by going in and turning round, but by retreating backwards into the cavity till the head only projects at the aperture. The one I am about to particularize stands in the middle of a pasture, bears the most venerable marks of antiquity, gives the name compounded of itself and its situation to the farm on which it grows, *viz.* Oakley Farm, and was the favourite retreat of a bull. Twenty people, old and young, have crowded into it at a time; a calf being shut up there for convenience, its dam, a two-year-old heifer, constantly went in to suckle it, and left sufficient room for milking her. It is supposed to be near a thousand years old; the body is nothing but a shell, covered with burly protuberances;\* the upper part of the shaft is hollow like a chimney, it has been mutilated of all its limbs, but from their stumps arise a number of small branches, forming a bushy head, so remarkable for fertility, that in years of plenty it has produced two sacks of acorns in a

\* It measures in the middle round these burls 29 feet 3 inches, round the stumps of the old arms 31 feet 6 inches in the smallest part; between two and three feet from the ground it is 26 feet in circumference.

season. These particulars, extraordinary as they may seem, I had from the farmer's own mouth, whose father and himself have occupied the land for very many years, and from appearances I think they may be credited. About twenty years ago, I had the curiosity to measure this tree; its head was as green and vigorous last summer as it was at that time; and though hollow as a tub, it has increased in its measure some inches. Upon the whole, this bears every mark of having been a short stemmed branchy tree, of the first magnitude, spreading its arms in all directions round it. In memory of the present tenant, the last remaining branch, one of the smallest, was found, extended forty feet from the trunk, and was cut off in his father's time for repairs upon the farm.

The aperture is a small ill-formed Gothic arch, hewed out, or enlarged with an ax, and the bark now curls over the wound—a sure sign that it continues growing; and hence it is evident, that the hollow oaks of enormous size, recorded by antiquaries, did not obtain such bulk whilst sound, for the shell increases when the substance is no more. The blea, and the inner bark, receive annual tributes of nutritious particles from the sap in its progress to the leaves, and from thence acquire a  
power

power of extending the outer-bark, and increasing its circumference slowly. Thus a tree, which at 300 years old was found, and six feet diameter, like the Langley Oak, would, if left to perish gradually, in its thousandth year become a shell of ten feet diameter; and hence it is natural to conclude, (as appearances justify it) that this tree, when in perfection, was nearly, if not quite, equal to that amazing one which belonged to the bishop of Salisbury. How shameful, to let nature have produced an oak like this in vain!

I am, &c. &c.

*Bosington.*

T. SOUTH.

*Dimensions of the Bull Oak, in Wedgenock-Park,  
Warwickshire.\**

	yd.	f.	in.
1 yard from the ground - -	11	1	0
1 foot above the ground - -	13	1	0
6 feet from the ground - -	12	1	0
Broadest side - - -	7	0	5
Close to the ground - - -	18	1	7
Height of the trunk, about -	4	1	0

The inside is quite decayed; and when I saw it, a cow and a sheep had sheltered themselves within it. The head is very round and flourishing.

T. O.

\* *Gent. Mag.* Sept. 1783.

LETTER

## LETTER V.

*An Essay on the Growth of Oaks, and on the Production of Crooked Timber for Naval Purposes.\**

“ Let India boast her plants, nor envy we  
 “ The weeping amber and the balmy tree,  
 “ While by our Oaks the precious loads are born,  
 “ And realms commanded which those trees adorn.”

POPE.

SIR,

PROVIDENCE with infinite wisdom hath ordained, that every country should abound in productions the most useful or salutary to its inhabitants.

\* Among the amusements which the country affords, I know none more delightful in itself, and beneficial to the publick, than that of *Planting*. I could mention a nobleman, whose fortune has placed him in several parts of England, and who has always left these visible marks behind him, which shew he has been there; he never hired a house in his life, without leaving, all about it, the seeds of wealth, and bestowing legacies on the posterity of the owner. Had all the gentlemen of England made the same improvements upon their estates, the whole country would have been at this time as one great garden. Nor ought such an employment to be looked upon as too inglorious for men of the highest rank. There have been heroes in this art, as well as in others.\* We are told in particular, of Cyrus the Great, that he planted all the Lesser Asia. There is indeed something truly magnificent in this kind of amusement :

\* William Duke of Cumberland, Bagshot Heath.

bitants. This sea-girt island depends upon oaks for its commerce and protection. These are found therefore in a variety of soils, in lands both stiff and light, both wet and dry but attain their fullest magnitude

ment: it gives a nobler air to several parts of nature; it fills the earth with a variety of beautiful scenes, and has something in it like creation. For this reason, the pleasure of one who plants is something like that of a poet, who, as Aristotle observes, is more delighted with his productions, than any other writer or artist whatsoever.

Plantations have one advantage in them, which is not to be found in most other works, as they give a pleasure of a more lasting date, and commonly improve in the eye of the planter. When you have finished a building, or any other undertaking of the like nature, it immediately decays upon your hands; you see it brought to the utmost point of perfection, and from that time hastening to its ruin. On the contrary, when you have finished your plantations, they are still arriving at greater degrees of perfection as long as you live, and appear more beautiful in every succeeding year than they did in the foregoing.

But I do not only recommend this art to men of estates as a pleasing amusement, but as it is a kind of virtuous employment, and may therefore be inculcated by moral motives; particularly from the love which we ought to have for our country, and the regard which we ought to bear to our posterity. As to the first, I need only mention, what is frequently observed by others, that the increase of forest trees does by no means bear a proportion to the destruction of them, in so much that, in a few ages<sup>b</sup> the nation may be at a loss to supply itself with timber sufficient for the fleets of England.

*Spectator*, No. 583—20th August, 1714.

<sup>b</sup> The writer little thought, that in less than one age, his prediction would come to pass.

nitude in rich black earth, in strong moist loams, and in sandy loams, or sands, with a stratum of clay beneath. Their tap-roots require some depth to strike in, their growth is quickest where the ground is free,\* but in stubborn clay is very slow till their roots have penetrated far; then they begin to thrive and produce the toughest and most lasting timber.

A famous instance of longevity, durability, and the amazing bulk they will attain in soils which suit them, has been particularized in the Langley Oak. †

A living and unexampled proof of the rapidity of their growth, when assisted by culture, may be seen at Stratton in Norfolk; where an Oak, planted by Mr. Marsham in 1720, is now above eight feet round at fourteen feet from the ground; but this had the advantage of manure, tillage, and

\* Kennedy, in his treatise on planting moors and commons, says, (vol. I. p. 127) "That in black moorish-land, where long heath grows, oaks thrive faster, and make finer shoots, than in any other soil."

What pity then it is but all such moors were planted!

I have seen oaks of large size protrude themselves from fissures of rocks, where no soil appeared. To clothe the naked crag with timber, merits our warmest praise.

† This tree was perfectly sound at 300 years old.



other judicious treatment, to which its hasty progress may be attributed, and to which few planters can or will attend.

The growth of middle-aged oak is generally from one inch 1-third, to an inch in circumference yearly; between its twentieth and its hundredth year, it sometimes exceeds this measure; and in its second century falls within it. But as the solidity of the shaft consists less in its length, than in the square of its diameter in the girding place, a small addition to the diameter there enlarges the square abundantly. Wherefore, though the circumference from the hundredth to the hundred and fiftieth year, may not increase so fast as it did to the hundredth, the solid contents will be increasing faster; for as the square of the diameter\*  $40 = 1600$  exceeds the square of  $24 = 576$  †, so will the contents in the 150th year exceed the contents in the 100th, when its annual enlargement was 1-8th of an inch greater.

\* Forty inches was the diameter of Fyfields Oak, in its 150th year

$$\begin{array}{r} 40 \\ \times 40 \\ \hline 1600 = \text{Its square.} \end{array}$$

† Twenty-four inches diameter of the same in its 100th year,

$$\begin{array}{r} 24 \\ \times 24 \\ \hline 576 = \text{Its square.} \end{array}$$

Under

Under the description of Fyfields Oak, I have endeavoured to prove, that this timber, though not so quick of growth at first as the softer woods, will pay ample interest to such proprietors as give it time to come to maturity. For oaks in the end will exceed in magnitude such trees as outgrew them in their infancy ; the period of the growth of the latter being over, before the oak begins to extend its timber through its limbs, it is then that it increases rapidly ; it is then that it pays for standing ; it is then that it makes amends for slow advances in the early stages of its progress ; producing more timber in the last twenty years, than it did in the whole first century ; and (quite the reverse of elm) the larger and more crooked the limbs are, (however short the bole) the more valuable is the timber.

*Tall straight oaks*, when of full size, are beautiful objects, whether single or in woods. They are requisite for beams, for kelsons, stern-posts and plank-stocks ; and great is the consumption of the latter ; for ships are planked both within and without with oak, save beneath the light water-line, where beech performs that office. The growth of oaks like these is the chief aim of the generality of planters ; and seems to have been the immediate design of the

surveyors of Dean Forest. Should their plan be adopted,\* the trees will draw one another up so fast, that scarce a crooked one will be found in 18 thousand acres, save round the out-skirts; and the soil will be full of stubs, which, as oak robs oak, must check the growth of the surviving timber.

Planters of all kinds (as before observed) should attend to the uses to which their timber may be appropriated. Inclosures made at Government's expense, therefore, should be nurseries for timber adapted to government purposes. The marine, being the first and principal object, should in the first place be provided for. Trees dispersed on open commons and extensive wastes, have hitherto produced the choicest timber; and though the returns of the forests have of late years, through mis-

\* They propose to turn fods upside down, at three feet apart, to plant one or two acorns in each fod with a dibber, taking out at the end of ten years every other tree; at the end of fifteen years every other tree again, to leave them at twelve feet apart;<sup>c</sup> at twenty-five years growth, to fell 132 trees on an acre; at thirty-five years growth, to leave the trees at twenty feet apart; and at forty-five years to leave 75 upon an acre, &c. &c.

<sup>c</sup> This is evidently a mistake; for to set them at twelve feet distance from each other, seven out of eight must be cut down. The whole indeed is incomprehensible, for after setting the trees at 12 feet apart, it would require a conjuror to set them at 20 feet.

management,

management, been very scanty;\* yet they have consisted of such valuable knees and crooks as the merchants would have found it difficult to have furnished. And if no provision be made for growing such in future, we, like the French,† shall be reduced to the necessity of using iron-braces instead of timber-knees.‡ In the present scarcity of these valuable articles, it is not only the business of the surveyors, but the duty of every member of the community, who is blest with the means, to try at their production. The French have attempted it by suspending weights to the heads of slender saplings, bowing them hastily towards the ground, which is not only an expensive, but inefficacious method, for it injures the plant by straining the bark and rupturing the sap-vessels. Let us take nature for our guide, study her means, and imitate her ways.

\* Two thousand loads yearly on an average of the last 20 years. The consumption of the docks is 25,000 loads.

† Vide Falconer's Marine Dictionary—article Knee.

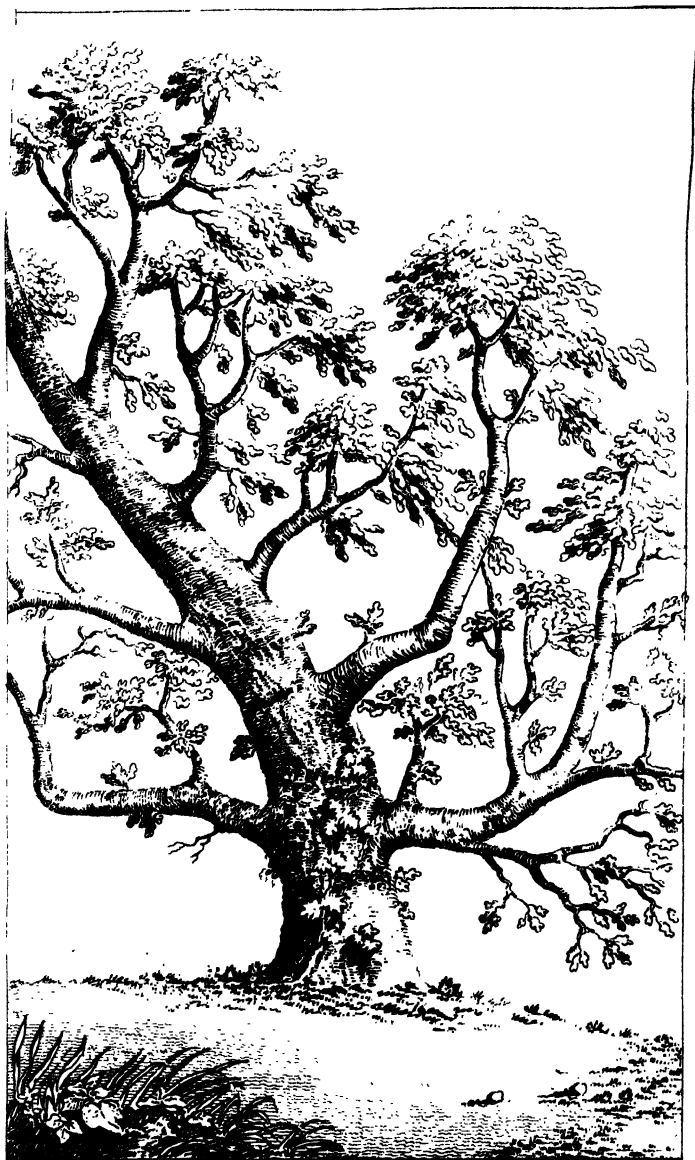
‡ The contractors for India ships have been already necessitated to use iron braces, through the scarcity of large knees, and in trading ships they are found convenient, as leaving more room for the freight; but in a man of war, the solidity of the timber knees adds greatly to the strength and stability of her sides, enabling them to resist the batteries of the enemy for longer continuance, and preserving the men in great measure from the destructive power of splinters.

Whoever traverses a forest, with the eye of curiosity awake, must remark, that almost every thorn becomes a nurse for timber. Acorns, or beech-masts, or sometimes both, dropped by birds or squirrels, vegetate freely under the shade and protection of the bushes, till they rise above the bite of cattle. Small groupes and single trees are thus produced ; their guardian thorns when overpowered perish. Then, having open space for their roots to range in, their growth becomes rapid, their bodies bulky, their limbs large and extensive ; cattle resort to them for shelter, enrich the ground with their droppings, the timber derives advantage from the manure, becomes productive of knees, crooks, and compass pieces, the chief requisites in naval architecture. Vide No. I.

If lords of manors, and men of landed property, would pursue the hint which nature here throws out, and employ the aged and infirm, to collect and dig among the thorns (with which the wastes, furzy commons, and aukward corners of their estates abound) such tree-seeds as the soil is best adapted to ; how soon would the face of the country be improved ! What varieties of flourishing trees would in a few years present themselves ! What provision made for posterity hereafter !



Plate I.



*Schneebühl &culp.*

Parks and pleasure-grounds might be rendered enchantingly beautiful, by clumps of quicksets, black-thorns, hollies, &c. interspersed here and there for the protection of acorns,\* purposed to be sown among them. Under their umbrage, oak-saplings, which delight in shade, would thrive exceedingly; be safe from the brouze of cattle, without the expence of fencing, and the lawns become bounded with stately timber, not only a lasting but improving ornament to future generations.

Why should we trust to chance to sow our woods? What would be the expence of a bushel or two of acorns set by hand a year before each cutting? when a man might pass between the stubs, planting them in vacant places at ten or a dozen steps apart; at such distances they would have room to grow without annoying the underwood, till their own value made amends for its deficiency.

Close planting I profess myself no friend to; oaks drawn up like hop-poles, excite my indignation;

\* Some years acorns are scarce and difficult to be got, but as such years of scarcity generally succeed to years of plenty, numbers of seedling oaks may be drawn from wheat-stubbles in the neighbourhood of woods, which if taken up careful and planted the same day, will grow readily and gain a year.



for it is with planters as with gardeners, the one thins not his trees, nor the other his fruit, till the mischief has been done; we suffer them to remain and impair each other, before we have resolution to displace them; and at last perform the business ill or sparingly;\* not reflecting, that one prime oak, or one prime beech, is worth a score of starvelings. Vide Mr. Nichols's Account of a Plantation in New Forest.

In plantations thus begun, however divested of incumbrances in the advanced stages of their

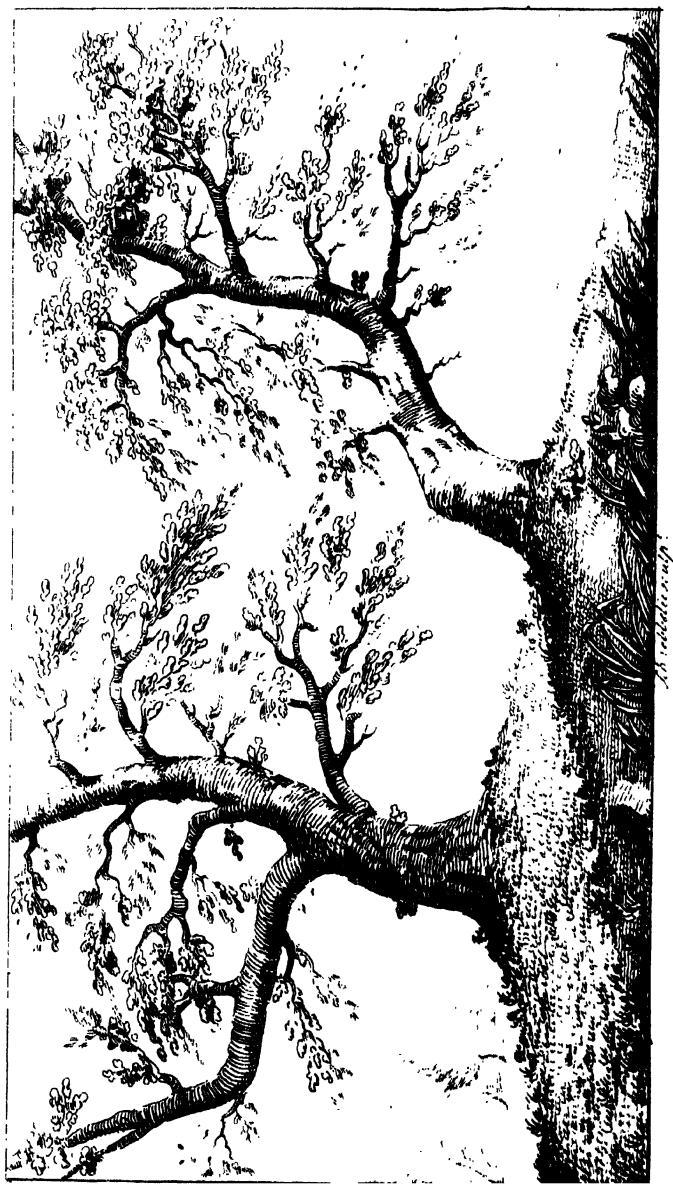
\* I remember a circular thicket of oaks on an eminence, which had at a distance the most pleasing effect, assuming the appearance of one immense round head, reaching almost to the ground. On a nearer approach, the stems of the cluster became visible, but stood so thick, that like the famous Indian Fig, they seemed to form a congeries uniting in one trunk. When amongst them, however, they were from 4 to 6 feet apart, drawn up to the height of 50 feet or more, but so slender as not to exceed 6 inches diameter in the middle of their shafts. They were great favourites of their owner, who set the acorns whilst a boy under the direction of his father, in whose time they had been thinned twice, and once by himself afterwards; on my lamenting that they had so little space allotted them, he acknowledged more room would have been better, and in a few years after thinned them rashly, taking away two-thirds at once, which he sold for 7s. a piece, leaving the best, as he thought, to improve. But these, divested of their supporters, bent like reeds before the wind, and after every sudden gust, reverberating forcibly, clashed their branches one against the other till dashed to pieces, those in the outer ring alone escaping. This hopeful grove of plants thus perished at half growth for want of early thinning.

growth,









growth, few if any knees or naval crooks will be found, except upon their borders ; we must look for these either in single trees, like No. I. in small groupes or in hedge-rows. In groupes, one or other often gains the mastery, as represented in No. II. or III. and forces the rest to bend forward till they have room for ascent. Trees, when few in number, enjoy a liberty nearly equal to single ones ; each has a space where its roots may draw nutrition ; and as these and the branches usually follow the same direction, the leading roots of the inferior trees will tend outwards, and finding nothing to obstruct their passage, will furnish supply sufficient to keep them thriving, notwithstanding the superiority of their antagonists.

In this age, when our stock of timber is so very low, and our impatience such, that we cannot wait till the small quantity that is left attains maturity, we must not expect to find many capital crooks in branches like those of the Langley Oak, but must produce them in the stem or bole of the tree ;\* which can only be done by a regular and constant

\* Deformity in a tree, like the same defect in the human body, deviates from the line of beauty, but national interest requires it to be promoted, that we may not, like our neighbours, be compelled to substitute iron braces in the room of knees and crooks.

oppression; the effect whereof may be seen in figures No. II. and III. and in hedge-rows where the timber stands thick, as No. IV. represents. The centre stick of the three, growing behind the others, and not finding room to spend its sap by rising betwixt their tops, made its way out to the sun and air, as appears in the draught annexed, forming a capital knee and valuable crook above it. In these instances we find a plain and useful lesson, *viz.* that trees, impelled to a certain direction whilst young, will continue growing in the same direction as long as they exist. Their natural tendency is doubtless towards a perpendicular; but if constrained to change this disposition early, they will proceed horizontally till they find room to ascend freely; and though they then immediately rise upwards, the curve they have taken will in great measure be preserved, even when the oppressors which caused it are no more. Hence it is manifest, that any quick growing trees of small value, may be used as instruments for forcing feeding oaks out of their upright line. Cuttings of coppice withy\* will, by the freedom of their growth,

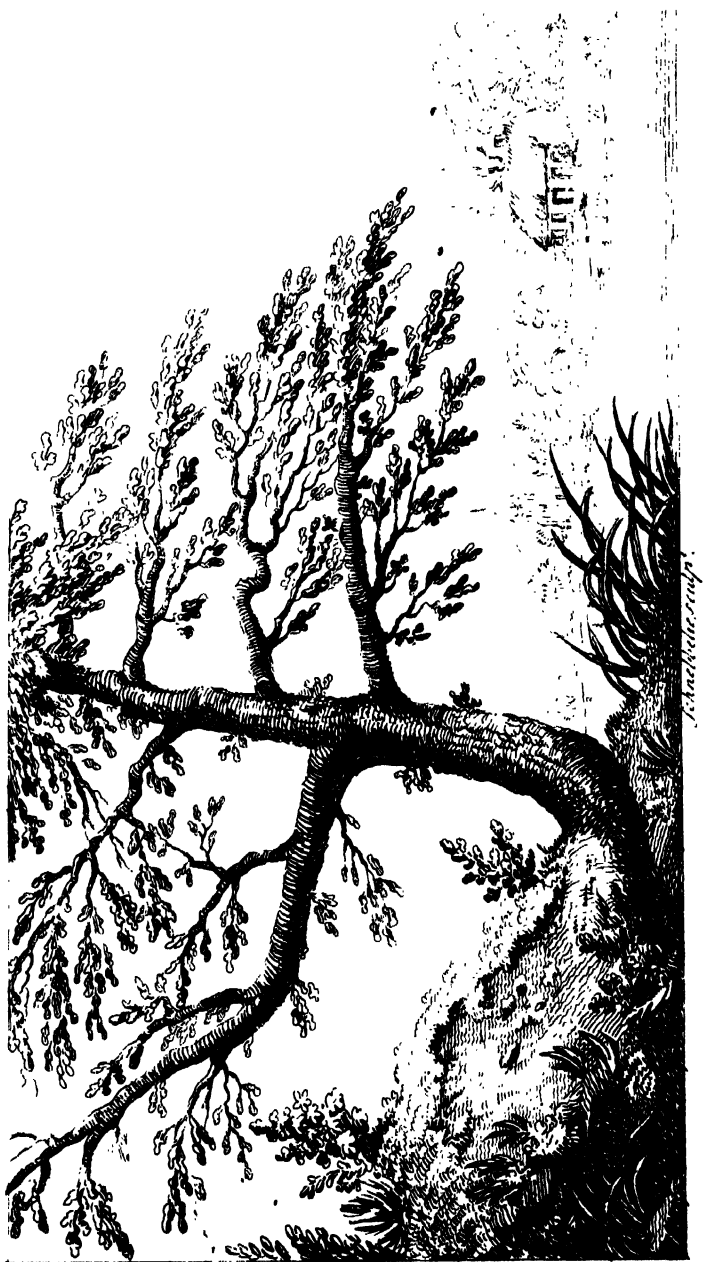
\* It may be observed, that I no where recommend the beech as a companion to the oak. It is in fact too mighty for it. When one stands near the other, the tree of the first consequence yields to the quicker growth of its rival, and comes to little.











*John G. Thompson*





(as represented No. V.) overpower the saplings, bearing them down almost to the ground for a time, and the purpose being effected, may for relief of the oaks be cut down as often as requisite, till, as they gain power, the withies in their turn give way. Plants like these, which extract nutrition of a different nature, though they promote a crook, will not starve or check the oaks beneath them.

Trees growing out of a bank frequently take a favourable turn like No. VI. Such are accepted by the king's purveyors as compass pieces, which gain admission into the dock-yards, though of less dimensions, and at a higher price than straighter timber. It may be proper therefore, in new inclosures, to throw up the banks high and broad, to plant quicksets on the outer slope, on the top withies, and at due distances near the base of the inner slope to dib in acorns; which in their future growth must incline forwards to avoid the projecting withies, and be some years before they can attempt a perpendicular. In such case the crook will be near the butt in the stoutest part of the timber, and the curve, thus formed in infancy, will retain its shape as long as the tree endures.

Having now shewn the means by which naval-crooks may be obtained at an easy expence; I proceed

ceed to recommend the growth of oaks, in preference to other timber, to every one who is possessed of soils suited to their production. Those who have wastes and furze-grounds thinly scattered with trees, and of small present value, may, by attention to the hints here given, render them not only of great consequence to themselves and families, but highly beneficial to the state.

All who with generous views, in this the time of scarceness, warmly apply themselves to raising oaks for publick good, giving up present advantages for their descendants' future gain, deserve a civick crown. In such attempts, let every liberal mind enjoy its own ideas ; some following one, and some another way. Then, whether we try saplings from the nursery, for open groves ; sow acorns mixed with nuts for coppices, or set them among bushes, it signifies little, so we do but plant, protect them from the bite of cattle, and thin them often, that they may not crowd and spoil each other. Defects of which instances have been given, that the like in future may be avoided.

I acknowledge to have thought with Mr. Miller, that oaks for timber should be raised from acorns sown upon the spot, rather than by transplantations ;  
that

that method, therefore, has generally been my practice. Mr. Marham now indeed has nearly made a convert of me. That gentleman's success almost exceeds belief; but he is blessed with a happy soil, and no one more deserves success than he does.

For sowing acorns, the inverted sod of the furveyors seems not equal to Mr. Pavier's method of preparing the ground by bringing it into good tilth. I would add, dung it well for wheat, throw it up into ridges, sow hazle-nuts, floss, haws, holly-berries, ashén and maple-keys, broad-cast with the wheat, and dib in acorns at ten or twelve feet distance, along the mid-ridges where the soil is best. At reaping-time, leave the stubble long to shelter the seedlings, and in the spring following, scatter some clover seed over the ground; much of it will grow to shade and protect the oaks when the stubble rots away. Patches of clover or wild vetches meliorate the soil, and promote the progress of the seedlings rapidly. These, as they advance, may be thinned and trained either to crooks or upright stems, as best suits the planter's purpose; for oaks, whilst the bark is smooth and white, may be divested of their straggling shoots without injury, for the wounds not being large will soon heal over, leaving neither blemish or dead knot behind.



For planting, the ground should be well trenched, and the oaks, if drawn from a warm nursery, must be set thick at first; but as soon as they appear in a growing state, should be thinned every three or four years at furthest, till set at twenty or thirty feet apart; even these distances are scarce sufficient for naval timber. Such as are taken out may be planted in vacant spots elsewhere; and if dug up carefully, there will be little danger of their failing.

AGRICULTURE, the life and soul of every state, hath been wisely and liberally encouraged by the *Bath Society*, under whose auspices it hastily advances towards perfection.

PLANTING, whilst it does not interfere too far with their chief object, lays the next claim to favour. Under the like sanction, methinks I already see our timber flourish. Honorary rewards incite the noblest minds to action, emulation of course ensues, and that spirit once abroad, the work is half performed.

From the small freeholder, little can be expected save the raising an orchard for his own convenience. It is to the owners of extensive property, that we are to look up for grand improvements. The  
growth

growth of timber solely rests with them. The preservation of their own families, the welfare of the community, nay, the very existence of their country, as a maritime state, depends upon their speedy exertions. The devastation which prevails in our woods, threatens their total destruction.\*— Without forbearance, the small stock that is left will presently be exhausted. British timber will no longer ride triumphant on the main. The docks must stand indebted to foreign countries for supply. Our ships will be of short duration, and our expenses wonderfully enlarged.

To conclude:—The exigency of the times so immediately demands attention, that had I the magick power of persuasion to reach the heart of every thoughtless land-owner, I would never cease exclaiming, O my countrymen! my countrymen! let us no longer yawn in indolence, lest a fatal lethargy ensue. No longer let us trust to chance, to birds, to squirrels, to be our planters, but better ourselves. Let us instantly refrain from felling half-

\* If there be not 1-5th part of the naval timber that there was 50 years ago now left, and the annual consumption in the dock-yards, be 25,000 loads, exclusive of the ships built for government in private yards, together with the increasing demands for commerce, East-India ships as big as men of war, &c. &c. what must be the consequence? Unless some check be given to our imprudence, another twenty years compleats our ruin.

grown trees; employ the poor and needy to scatter acorns with a liberal hand; beseech the Almighty of his goodness to prosper our endeavours; then we may live to see our woodlands once more crowned with naval timber, our landscapes skirted round with lordly oaks, and our estates descending to posterity, with the sure and glorious prospect of enriching and protecting their possessors!

I am, &c. &c.

Bosington.

T. SOUTH.

#### ADDITINOAL LETTER TO THE SECRETARY.

*[The Subject announced in the following Letter, is of so interesting a Nature, as to bespeak the Attention of Country Gentlemen at large. And the Work preparing for the Press, by so able a Hand, cannot fail of being impatiently expected by the curious in Wall-Fruits.]*

SIR,

**B**Y many of your obliging letters, I have been invited to communicate to the Society further accounts of my rural labours than those I have already troubled you with. Such have been confined within the narrow compass of twenty acres of meadow,

meadow, some scattered plantations, an acre and a half of garden-ground, and the production of the Peach and Nectarine.

The improvement of the former has been amply enlarged upon by abler hands. The culture of the latter seems to have been either little attended to, or imperfectly understood. That trees, with skilful management, will produce fruits superior in size, beauty, and flavour, to those of the same species in an indifferent state of culture, is a fact too well known to be controverted. When we meet with aqueous insipidity, where vinous juices should prevail, our climate is condemned as unfavourable, and the ill consequences of our own misconduct, negligence, or ignorance, are attributed to its want of benignity. Bad soils, and wet seasons, make indeed great difference in the flavour of their productions; but the former may be corrected, and the latter so seldom happens in the extreme, that nine years out of ten, I trust we can produce both the peach and nectarine within this kingdom, equal, if not superior, in quality to the boasted produce of our neighbours on the continent.

I dare not risk an assertion so opposite to the general opinion of my countrymen, (who think they must travel southwards to taste these fruits in perfection.)

fection) without producing testimonies to my credit. I therefore refer to *Sharpe's Letters*,\* already in

\* "Whilst I was in England, I never heard the words Northern Climate pronounced, but they conveyed to me an idea of barrenness and imperfection. I had always conceived, that vegetables and garden fruits obtained a flavour in the more Southern climes, unknown to the latitude of 52. But to my great surprise, I do not find that they are equal in taste and sweetness to those which grow in our gardens, and what is still more surprising, few of their fruits excel ours; I believe none, except their water melons, their grapes, and their figs. If they have not peaches to be compared to ours, I presume it is owing to the violence of the summer suns, though possibly it may arise from their ignorance of cultivation in Italy.\* A certain noble of Venice, well known in the polite world for his attachment to the fine arts, has procured a skilful gardener from England, within these few years, in hopes of improving the culture of his garden; I conversed with this gardener, whom I found under a state of discouragement and despair. He told me he had not ever tasted a peach in Italy of a true flavour, and he believed he never should; for that he was thwarted and obstructed by the other gardeners in his attempts to reform their practice; that he had no authority over them, but was confined to his own proper department, which he told me would answer but very little purpose."

*Sharpe's Letters from Italy, dated Naples, Nov. 1765.*

Peaches in Rio de Janeiro [almost under the Tropic of Capricorn] are mealy and insipid. Cook's Voyage, by Hawkesworth, 2 vol. p. 33.

[Mr. S. though handled roughly by the writer of the Sentimental Journey, possessed a soul congenial to his own. Had that

\* Perhaps from both causes.

in the hands of the publick, and to a private letter or two inclosed, in confirmation of what is ad-

celebrated author seen him (as I did) perform the following office of humanity, he would have treated him more tenderly, and for his virtue's sake, have buried his foibles in oblivion.

### ANECDOTE.

Mr. Sharpe, when he resided in Surry, used frequently to hunt with Mr. Northey's harriers. I was riding with him by the side of them one day, when a heedless servant galloped in among the pack, kicking one of them to a distance; the poor animal yelled woefully; Mr. S. stopped immediately, and ordered his groom to examine the hurt; a leg was broke in two places. He himself, tho' of the first eminence in his profession, alighted, took the dog in his arms, sat down upon a mole-hill, dispatched his servant to a distant juniper bush to cut splinters, took off his own garter, set the poor creature's fractured limb, bound it up with the utmost tenderness, laid it upon his own great-coat, on the pommel of his servant's saddle, directed him to walk his horse gently with it to Epsom, told him the position it should be confined in, and that it should be fed by hand till a callous was formed, which being readily complied with, (as it was a favourite dog of Mrs. Northey's) it soon grew well, and before the hunting-season was over, followed the sport with its wonted keenness.

Though fond of the diversion, and impatient of delay when the hounds were running, I tarried on this occasion, and was eye-witness to the scene, which I think preponderates in the scale of humanity, before either of those famous ones of the Monk and his snuff-box, the dead ass, or weeping Maria, so inimitably wrought up by Sterne himself.

As Mr. Sharpe was well known at Bath, it is with pleasure that I send thither this tribute to his memory.

T. SOUTH.

The above anecdote, though not AGRICULTURAL, will not be displeasing to the lovers of humanity in that line.]

vanced, and from long observation can venture, Sir, to assure you, that a due south aspect, hitherto thought absolutely necessary to bring these fruits to perfection, often proves injurious to our choicest peaches, and causes our nectarine trees to cast their fruit unripe.

In cold wet summers, France may have the advantage of us, but in warm and dry ones, I am confidently persuaded to the contrary. The unusual heat of the 2d, 3d, and 4th of August 1788, affected my fruit on the south and south-west walls, in such a manner as to alter its very nature, so that the Montabon, the Nobles, and other peaches, usually juicy, rich and vinous, became in such aspects, that summer, dry and mealy. Hence I rationally draw this conclusion, that our climate, however it may have been rashly condemned, is more apposite to the production of these fruits, than any other whatsoever, unless perhaps some districts of Persia, to which they are indigenous, may prove an exception. Above thirty years experience and close attention to their culture, warrant such a conclusion.

The unprecedented success with which my labours have been crowned, induces my friends to be solicitous, that the knowledge I have obtained, may not die with me. In compliance with their request,

request, I have begun preparing a communication of my practice to the publick; and in order to qualify myself to throw the strongest light possible on the subject, have stocked my garden with every species or variety of these fruits now cultivated either in France or England. Such another collection is not, I believe, to be found in this country. The generality of fruits have long been familiar to me; of the particulars hitherto unobserved, many are in a train for bearing next summer, and the rest the year following:—when, having grown them all in the same kind of soil, and under one and the same mode of treatment, it will be easy to determine whether the varieties pretended to, really exist, to mark the specifick differences of one from the other, to judge of their respective merits as to size and flavour, so as decidedly to point out those which deserve future propagation, from those which, being comparatively worthless, ought to be condemned to perpetual exclusion.

Having made this single branch of horticulture my study, both in theory and practice, for thirty years and upwards, and having proved, to the astonishment of many, that wall-trees will perfectly conform to the will of the pruner in the due arrangement of their branches; in their general resemblance to each other; in an aptitude to furnish the wall in



every part with the richest garniture of leaves, bloom, and fruit, in their respective seasons ; I think I may, without presumption, attempt to instruct others how by the same means they may effect the like purposes. To do this methodically, I shall begin with trees in their infancy, advance gradually through the several stages of their progress, and accompany them till they arrive at maturity. To point out the mistakes that some have fallen into ; to shew the defects of modern practice ; to contrast imperfect with perfect figures, will require copper-plates exhibiting their varied appearances in the pruned and unpruned state ; by which an accurate observer may, with the assistance of the remarks accompanying them, easily attain a knowledge of the subject sufficient to enable him to manage his own wall-trees, and obtain such fruit as he seldom sees elsewhere. A new field of innocent and useful amusement will here be laid open for the country gentleman to employ his leisure hours in rural retirement, and to fill up the intervals of study, to the resident clergy, in a way by no means unbecoming their function. Mr. Laurence, rector of Bishop's Weremouth in Durham, the best pruner of his time, recommends the practice to his brethren as a recreation that will fill up those little parentheses of their lives, which commonly go for nothing, in an interesting and pleasurable manner.

Having

*Having read most of the books hitherto published relating to this art, and not finding one that teaches the true rudiments, there seems to be an opening left for a work of this kind, which I have not in contemplation only, but in some forwardness, as you will perceive by the drawings sent herewith.\* Many of them being in a rough unfinished state, shall I trouble you with laying them before the artist who reduced the oaks, to know whether he will copy and improve some particulars, and shade and finish others, according to the directions accompanying them? In casting your eye over the drawings, with the few explanations which attend them, you may give a guess at the design and utility of the work. If you wish to communicate them to some few of the ingenious members of your society, you have my permission. If in your united opinions, a work*

These drawings are in themselves masterly, and the artist now employed in finishing them is a man of first-rate abilities. The testimonies to the superior excellence of the author's *FRUITS*, are the most respectable and full. W. M.

The work is to be entitled, "The Gentleman's Recreation in the Fruit Garden; or, a Treatise on the Culture of Peaches and Nectarines; embellished with plates, and notes explanatory to a regular system, for the training, pruning, and management of Wall-trees, from their infancy to advanced old age: with directions how to obtain a constant even crop of the most delicious fruit; with thoughts on the production of flavour; cures for the several diseases fruit-trees are prone to; the prevention of blights, destruction of vermin, and preservation of the fruit in full beauty, till arrived at the height of perfection."

of this nature may prove worthy the patronage of the publick, it will excite a glow of spirits sufficient to support me through the labour of a quarto publication, intended to make its appearance in 1793, if nothing happen to prevent it. Improvements in agriculture, under the auspices of the Society, may admit some intervals of leisure, for attention to the luxuries of the wall. I intend therefore to beg the favour of the Society, to add a copy of the work to their collection; and if it shall be found to merit approbation, to honour the author with giving it their support.

I am, Sir, &c.

*Mr. William Matthews.*

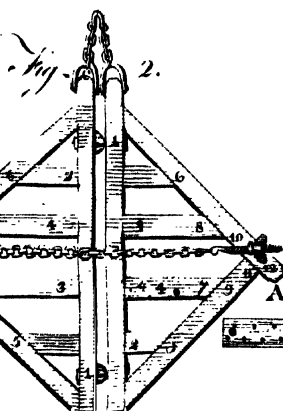
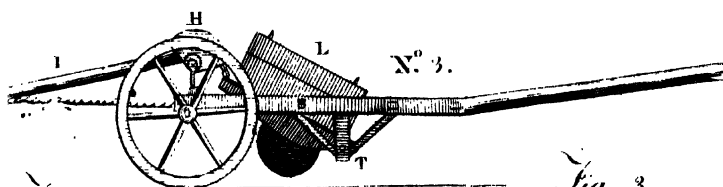
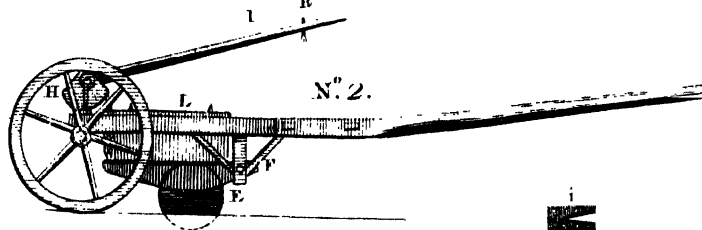
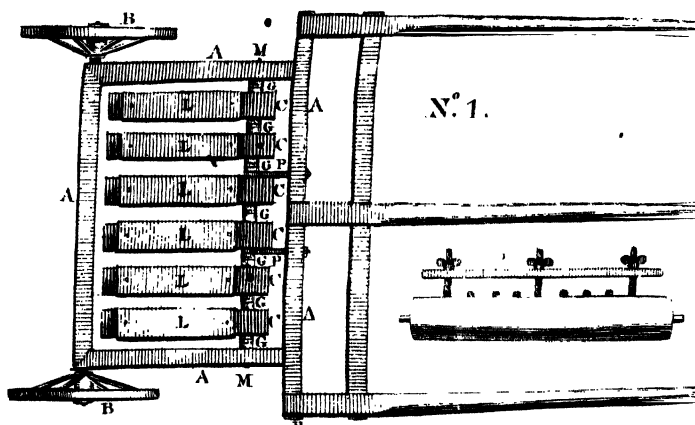
T. SOUTH.

[N. B. The foregoing familiar Letter, &c. &c. were not sent by the Author for publication in this volume; but he will pardon the freedom of the insertion, in proportion as it must give pleasure to the publick. And to announce a work to which the publick favour will become due, is compatible with that advancement of science, which this Society professes.]

## ARTICLE II.

*A Description of the Instrument, called a Sward-Cutter, invented by the Hon. Robert Sandilands some time ago, now much improved, particularly with regard to the Expence, it being reduced from 15*l.* or 16*l.* to 5*l.* or 6*l.**

**F**IG. I. No. 1, A. A. &c. a square frame three feet four inches from the fore to the hind part, by four feet three inches, the breadth of the





the machine within side; the timber (when of fir) four inches square, placed on two wheels B. B. three feet diameter, a little more or less, (the old forewheels of a chaise may answer the purpose) to support the hind part of the machine.

C. C. &c. six strong pieces of wood, called bulls, three feet long, five inches and a half broad, the thickness six inches at E, No. 2, and tapering to three inches at F. Into these bulls are fixed the cutting wheels, which are iron, 13 inches diameter, 3-quarters of an inch thick at the centre, about an inch diameter, for piercing holes to fix the iron axles in; from that they are to be of such thickness, as to allow the edges to be well steed. These wheels are fixed by two bolts going through the bulls, with eyes on one end, for the axles of the wheels to run in, and nuts and screws on the other, to make them very firm by, and sunk in the bulls, to prevent their interfering with the weights L. resting on them.

G. G. in No. 1, are hollow pieces of wood, called *thorles*, each three inches and a half long, which inclose the bolt M. and keep the bulls C. C. at their proper distances, but may be made longer or shorter at pleasure, as the ward requires to be cut in larger or smaller pieces. They are in two pieces, and bound together, and jointed by a strap of leather or cord,

cord, which allows them to be readily changed, when the cutting wheels require to be kept at more or less distance.

The iron-bolt M. No. 1. goes through two pieces of wood or iron, seven inches long, clear of the wood, supported by iron stays, fixed to the frame, and through all the bulls, as at T. No. 3, it requires to be strong, as the draught of the horses terminate there.

H. H. No. 2 and 3, a cylinder or segment of wood, seven inches diameter, called a *rocking-tree*, which goes across the frame, and moves on the pivots fixed into it, one at each end, supported by an iron-bolt, or piece of wood morticed into the frame, eight inches high, as appears in No. 2 and 3, to which six chains or ropes are fixed by hooks, at different distances, as you want your cuts, at 9, 8, 7, or 6 inches from one another, and are joined to the end of each bull, in which the cutting wheels run; so that when the rocking tree is turned about by the lever I. fixed in the middle of it, all the bulls, with their cutting wheels, are raised out of the ground at once, as in No. 3, by which means the machine may be turned, or moved from place to place with great ease, without any danger of straining the wheels..

N. B.

**N.B.** The rocking tree is not delineated in No. 1, in order that the plan of the frame may be more easily understood.

**L. L.** No. 1, 2, 3, are weights of free-stone, 26 inches long, six inches broad, the under one four inches thick, the upper one of the same dimensions, and three inches thick, which will weigh (according to the gravity of the stone) about four stone the under, and three the upper, all of them having two holes in them, thro' which iron spikes, firmly fixed in the bulls, pass, in order to keep them steady.

When the ground is easily cut, the under stone, of four stone weight may answer ; when more difficult, the other stone of three stone weight may be added, so that every wheel may have seven stone weight upon it, which has been found sufficient for the stiffest land and toughest sward the machine has ever been tried on. Cast-iron weights will answer fully better, but are more expensive, which the inventor wishes by all means to avoid.

The lever **I.** No. 2, 3, which ought to be five feet long, must have a sliding rope on it, fixed to the back part of the frame, so that when the cutting wheels are all taken out of the ground three or four inches,



inches, by the rocking tree's being turned partly round by the lever, the rope is then fixed to it, by putting a loop at the end of the rope over the pin R. No. 3, (it ought to be placed three feet four inches from the extremity of the lever I.) which keeps all the cutting wheels out of the ground till the machine is turned, and then, by moving the loop of the pin, it slips back towards the frame, and the lever is gently let back to its place, as in No. 2, by which the cutting wheels are put into their former posture, by the weights fixed on the bulls in which they run. The levers may be made of good tough ash.

P. No. 1, a small bolt of iron, with a hook on one end of it, (one is sufficient) to strengthen the bolt M. to be hooked on the centre of it, and joined to the frame by a nut and screw. —

The grooves, in which the cutting wheels run, may be covered below at the hinder part with a plate of thin black iron, six inches long, three inches broad, having a slit in it where the wheels run, to prevent (if found necessary) any grass, weeds, or small stones, from filling the grooves, and clagging the wheels; the form of which is seen at the letter i.

To the frame, as seen at No. 1, are fixed (for a double-horse Sward-cutter) three shafts, as in a waggon, of such length, strength, and distance from one another, as any workman may think proper.

For a single-horse Sward-cutter (which has only four cutting wheels) a pair of shafts are used, and may make the two sides of the frame without any joinings. The width of the frame, in proportion to the double-horse Sward-cutter, is as four to six.

It is recommended for a double-horse Sward-cutter to have eight bulls and wheels, that when it is used to reduce hard cloddy summer fallow, or land for barley, before the last furrow, or even after it, the whole weight, 42 stone, employed in sward-cutting the stiffest land and toughest sward, may be applied to the eight bulls then at six inches from one another : the four stone weights to be applied to six of the bulls, and two of the three stone weights to each of the additional bulls, which is thought will prove a sufficient weight for the purpose, and will effectually prevent a clod, at any time, of more than six inches broad, from escaping being broke to pieces.

In the same manner, a single-horse Sward-cutter may have six bulls for the above-mentioned purpose ;

pose ; the 28 stone belonging to it, divided thus : the four stone weights to four of the bulls, and two of the three stone weights to each of the additional bulls. It was thought better to be rather minute here, than trouble the person employed in using the fward-cutter with any calculations.

That the instrument may come as cheap as possible to the publick, the inventor is of opinion, that the expence of the two wheels and the iron axle (which is considerable) may be saved, by joining strongly to the frame at S. No. 3, a piece of wood with a little curve at the extremity of it, resembling the foot of a sledge, formerly much used in Scotland, to carry in the corn from the field ; the part of it resting on the ground being kept 18 inches (the half diameter of the wheels) from the frame, by a strong support of wood.

As the two outer bulls next the frame are apt to get under it, so as to prevent the cutting wheels from being taken out of the ground, a thin slip of iron fixed to the inside of the frame, nearly opposite to the back end of the bulls, of convenient length, will be found necessary.

*A short Account of the uses of the Instrument called  
a Sward-Cutter, with the advantages attending it,  
and the manner of using it.*

THE original intention of this machine was to prepare old grass-ground for the plough, by cutting it across the ridges, in the beginning of, or during winter, when the ground is soft, in order to answer all the purposes that Mr. Tull proposed by his four-coulter plough, so strongly recommended by him for bringing grass-ground that has been long rested into tilth. This the Sward-cutter has been found to do, much more effectually and expeditiously, as Mr. Tull's plough, with four coulters, cut the sward in the same direction with the plough, and is liable, from every stone, or other obstruction any of the coulters meet with, to be thrown out of its work altogether, or the instrument broke, to which the Sward-cutter, consisting of four, six, or more cutting wheels, is never liable, from their being entirely independent of one another, cutting the ground across the ridges before plowing, and rendering that operation easier to two horses than it would be to three without its being cut. The furrow being cut across, falls finely from the plough in squares of any size required, not under six inches, in place of long slips of tough sward, seldom

feldom and imperfectly broke by the four-coultered plough.

Any person who reads Mr. Tull's description of his four-coultered plough, and what he proposed by it, will soon see the great advantage the fward-cutter has over it, in producing the desired effect of bringing old rested grass-ground into tilth; an object universally allowed to be of no small importance to agriculture.

This instrument is very fit for preparing ground for burnbating, as it will save much hand-labour.

It may be properly used in cross-cutting clover, of one or two years standing, to prepare the ground for wheat, if the land be stiff and moist enough.

It may be applied to cutting and cross-cutting pasture-ground, intended to have manure of any kind put upon it to meliorate the grass. In this it will far exceed the scarificator, mentioned in one of Mr. Young's tours, as that instrument is liable, as well as the four-coultered plough, to be thrown out of its work when meeting with a stone or other interruption. This the fward-cutter is proof against, which is looked on as its greatest excellence.

In preparing for barley, the fward-cutter excels a roller of any kind, in reducing the large hard clods in clay land, occasioned by a sudden drought, after its being plowed too wet; and it is likewise very proper for reducing such clay land, when under a summer-fallow. In this operation the fward-cutter is greatly to be preferred to the cutting roller, likewise mentioned by Mr. Young in one of his tours, from its wheels being all dependent one on another, so that when one is thrown out by a stone, three or four must share the same fate: besides, the cutting roller has but seven wheels in six feet, and the fward-cutter has six in four feet three inches. at nine inches distant; and, if necessary, may have them so near as six inches.

After old grass-ground is cut cross with the fward-cutter, and plowed, it has a very uncommon and worklike appearance, from each square, turned over by the plough, being raised up an inch or two at the side last moved by the earth-board; so that the field, when finished, is all prettily waved, and resembles a piece of water when blown on by a gentle breeze. By this means a very great deal of the land's surface is exposed to the frost, and other influences of the air, which cannot fail to have a good effect on it.

Two horses are sufficient for the draught of a double-horse fward-cutter, and one horse for a single-horse one; one man manages the machine, and drives the horses. He begins his operation by first measuring off twenty or thirty paces from the machine, less or more, as he inclines, and there fixes a pole. He then cuts the field cross, as near at right angles with the ridges as he can. When the cutting wheels are past the last furrow about a yard or so, and the machine is upon the outmost ridge of the field on which it must turn, he must stop the horses, then take hold of the lever I. fig. 1, No. 2, and by pulling it to him, he raises the cutting wheels out of the ground, which are kept so by the loop of the rope being put over the pin R. in the lever I. No. 3, till the machine is turned and brought to its proper place, which is done by measuring off the same distance formerly done on the opposite side of the field. When the cutting wheels are exactly over the outmost furrow, then, on the horses being stopped, slip off the pin R. and the lever returned to its former place, as represented No. 2, which allows the weights L. L. &c. to force the cutting wheels into the ground again. He then goes on till the interval betwixt the first and second stroke of the machine is all cut. In this manner the field is to be finished, after which you may begin to plow  
when

when you please.—N. B. There must be a pole at each side of the field.

It is of no consequence whether the land to be sward-cut is in crooked ridges, or straight, in flat ridges, or in very high-raised ridges; such as are frequently met with in Scotland. Be the surface ever so uneven, it does not signify, as the cutting wheels being all independent of one another, are forced by their weights into every furrow or hollow.

One Sward-cutter will cut as much in one day as six ploughs will plow.

The land may lie several months in winter after being sward-cut, when there is no vegetation to make the cuts grow together again before it is plowed; but the sooner it is plowed after cutting, the better, that it may have the benefit of all the winter's frost, which makes it harrow better and easier at seed time.

When the ground is harrowed, the harrows ought to go with the waves that appear after plowing, not against them, as by that means they are less apt to tear up the furrows all cut into squares. This need only be attended respecting the first two times, as they are called, of the harrowing.



Any common wright and smith may make the instrument. It is very strong, very simple, and easily managed, and moved from place to place; and if put under cover, will last many years.

Fig. II. is the plan of a harrow invented by Mr. Sandilands, which he recommends in a particular manner, and to which he has given the name of the *Chain and Screw Harrow*. Its properties are, that if your ridges are high, and you wish to harrow them from one end to the other, by lengthening the chain (which the screw commands) the harrow, when drawn along, forms an angle downwards, and misses none of the curve of the ridge, so far as it extends, which may be nine feet, the distance from A. to B. The distance from C. to D. is five feet six inches. When the crowns of the ridges have got what is thought sufficient harrowing lengthwise, you shorten the chain by the screw, which forms an angle upwards; the harrow is then drawn by the horses, one on each side of the furrow, which completely harrows it, and the sides of the ridge if eighteen feet broad.

When you want to harrow even ground or high ridges across, with the screw you can bring the harrow to be horizontal, so as to work as a solid harrow without a joint.

The teeth are formed and fixed in the common manner, square, not in the fashion of coulter, and are nine or ten inches below the wood, and of such strength as is thought the land requires. The teeth cut, or rather tear the ground at every four inches without variation, though seemingly placed irregularly without any risk of choaking, except sometimes at the extreme angles, where the teeth are necessarily near each other, which may be cleaned with the greatest ease, by raising them a little from the ground. The figures 1, 2, &c. point out where the twelve teeth on each side the harrow are placed.

Where a strong brake-harrow is not necessary, by making the teeth shorter or lighter, you may have forty-eight teeth, which will tear the ground at every two inches, or near it, cover the seed well, and make a fine mould.

It is recommended, that harrows for every purpose, and of any size, be made on the above principle, from which no tooth can ever follow the track of another, and all are kept constantly acting.

Fig. 3, and 4, the plan and profile of a harrow likewise invented by Mr. Sandilands, called a Wrack Harrow, from its very expeditious manner of bring-

ing the wrack or roots of couch-grass and other weeds together. It consists of a plank of timber, six feet long, nine inches broad, and two inches thick, in which there are two rows of teeth fixed, twelve in front, and thirteen in rear, about four inches row from row, and about five inches from each other, which, in effect, brings the teeth to operate at two inches and a half one from another. They are in length about seven inches below the wood, three quarters of an inch square, not sharp, but pointed diamond ways, so as not to penetrate the soil, but only to catch what by preceding thorough harrowing is brought above ground. To the plank is joined shafts for a horse, and handles for a man, of such length and strength as any workman may think necessary.

The manner of using the harrow is as follows : When the land is so well harrowed, as that all the roots of the quickens or couch-grass, &c. are brought to the surface, the harrow is drawn across the field, the holder pressing a little, not much, on the handles, till the plank is immediately over the first furrow ; on which, without stopping the horse, he suddenly lifts the harrow which the shafts support before ; by this means, all the stuff gathered by the harrow, drops in the furrow ; so on he must go ;

go ; and when he has crossed the field, he turns to the right or left, and crosses the ridges again, as mentioned, observing not to miss any of the land, keeping close by the last track. From this operation, the whole wrack, &c. is left in the furrows, ready to be carted off the field, or burnt, as the farmer chuses. If the horse is not steady, a boy must be employed to lead him.

### ARTICLE III.

*Queries of Mr. LE BLANC, respecting the culture of Turnip-rooted Cabbages, with Answers to the same, by Sir THOMAS BEEVOR, Bart.*

1. **A**RE they not a much longer time before they are fit to be hoed than turnips ?

*A.* Yes, three weeks or a month.

2. Is not the hoeing consequently the more difficult and expensive, as the weeds have the greater advantage over them ?

*A.* In a wet season the hoeing is certainly more difficult ; on a clean fallow, and in a dry season, very

little more; and I have never paid more for hoeing them, than for common turnips.

Q. 3. The colour of the plant being darker than that of a turnip, and more difficult to distinguish from the charlock, which generally abounds in turnip fallows, particularly the most early sown, is it not another reason why the hoeing should be more difficult and expensive?

A. My workmen say, they can readily distinguish them from charlocks; and have never yet charged me more for them.

Q. 4. How many times are they hoed, and at what price?

A. This must depend partly on the season; they are generally twice hoed, 4s. for the first hoeing, and 2s. for the second.

Q. 5. Has it ever been observed, that the hardness of the root affects the sheep's teeth; that objection having been made to them by shepherds?

A. Not keeping any breeding sheep, but only wethers, which are sold fat after having fed on them in the latter part of the spring of one season, or two at the most; I have never observed the mischief charged to them.

Q. 6. Is

Q. 6. Is there any difficulty in making the sheep eat them up clean ?

A. I have not observed any, by making a lean stock follow the fat ; but if there be, hogs will greedily eat up all the pieces, and thrive greatly upon them.

#### ARTICLE IV.

#### ON VARIOUS SUBJECTS.

*To the Secretary.*

SIR,

*Hethel, Nov. 20, 1791.*

THE honour done me by your assurance, that the Gentlemen of the *Bath Society* would be pleased to receive the communication of any such facts or opinions, connected with their views, as shall have fallen under my observation, being too flattering not to have excited in me the utmost ambition to comply with their desire ; I have, in conformity with their wishes, ventured to address to you a few articles of information on some of the different subjects of their enquiries. Immediately on the receipt of your last letter, I made frequent enquiry amongst the Gentlemen of my acquaintance in this county, who have large fir plantations on their estates, whether they had ever observed that  
great

great damage done amongst them by the *squirrels*, which is so much complained of by some gentlemen in the counties of Somerset and Wilts; and I have reason to believe, from that enquiry, that the evil is not confined to the abovementioned counties, as on two estates in this county, on which I believe the plantations of Fir are by far the most considerable,—I mean those of the Marquis of Townshend and Mr. Coke,—I am informed by the latter Gentleman, that the injury done to those trees is so very great, that the price of a shilling per head is paid by him for all such of these mischievous little animals as are destroyed in his plantations; at the same time he told me, that, in Lord Sherborne's park in Gloucestershire, the mischief done by these animals among the beech trees is very considerable: in my own plantations, neither beech nor fir-trees, of which last I have many, have suffered from them; but they every year bite off most of the young shoots of the young horse-chestnut trees, so as totally to deprive them of one of their principal ornaments, that of their flowers, for which they have long been proscribed by me.

In answer to your enquiry, respecting Oak Plantations, I have inclosed to you those returned by the gentlemen of this county, to the questions on  
that

that subject, addressed by the Commissioners of the Land Revenue to the Chairman of their Quarter-sessions; which answers, having been drawn up from the best information that could be obtained from several principal timber merchants, as well as from the observations which were communicated to me by some of the most intelligent gentlemen of this county, may, I think, be fairly deemed, though perhaps not the universal, yet the general opinion of those here, who are most and best informed upon the subject.

In the 2d Number of the second volume of Dr. Anderson's periodical publication, called the BEE, you have, I make no doubt, seen a new and easy method of forcing early potatoes, very accurately described by the Doctor, as also in the 8th No. of the 3d volume of the same entertaining and useful performance, the account which I gave him of my accidental discovery of the mode of obtaining them in the most early part of the spring. To that account, whether it shall serve only for amusement, or may eventually be of any public benefit, I hope I may be allowed to add, that in order to see whether the Potatoes, produced as therein mentioned, had all the properties of those growing in the regular and ordinary course, and would reproduce as good a  
crop



crop as their parent roots; I took some of those which had grown in the house, and planted them in my garden; which, although planted so late as in the latter part of the month of June, have grown well, and afforded me several roots as large and good as any of those grown this year in the field; at this my surprise has been the greater, because the sets had but a few eyes, and those were very small. If this experiment should ever enable a poor man, whose stock of Potatoes has been much diminished by the wants of himself and family, to find a sufficiency for his future crop, it cannot be deemed wholly useless.

I have this year on my farm some acres of the Swedish Turnip, called Ruta Baga, which notwithstanding the dryness of the summer have grown to a reasonable size, weighing upon an average about three pounds and a half each without their leaves: this crop was not sown until the 27th of June, whereas had it been sown earlier, which the drought prevented, I am very certain the plants had been much larger; as on those gentlemen's lands where they were sown in May, the roots are at least one third bigger. However, their want of size never diminishes the crop so much as is apprehended, if, at the time of hoeing them, they are left proportionably  
thicker

thicker on the ground. From that experience which I have had of them, I conceive from eight to ten inches to be a sufficient distance for these plants. On the first of October last, I had some of those which had perfected their seeds in the autumn taken out of the ground, and found their roots sound and very palatable; but for a just and true account of these most valuable turnips, and the proper use of them, I cannot do better than refer all farmers to the account given of them in the eighth Number of the Third Volume of the BEE.

The dibbling of wheat, notwithstanding the introduction of Mr. Cook's drill-plough by several gentlemen and some farmers upon their lands, still continues to be the most general and favourite practice of this county; if the crops raised by this method be equally good, (and no experience has yet proved them to be otherwise) I cannot but wish, for the sake of the poor, that it may never be abandoned for any other.

I am, with real regard and esteem,

Your's,

T. BEEVOR.

*Questions*

*Questions addressed by the Commissioners of the Land Revenue to the Chairman of the Quarter-Sessions of the County of Norfolk.*

*Question 1st.* WHETHER the quantity of large oak timber in general, fit for the use of the navy, growing in the county aforesaid, is increased or diminished within memory?

*Answer.* It is certainly diminished in some parts of the county, but not generally so.

*Q. 2.* Whether particularly the quantity of *such* timber, growing in woods, is increased or diminished?

*A.* The quantity of *such* timber growing in woods appears to be inconsiderable, and neither much increased or diminished.

*Q. 3.* Whether there is an increase or decrease of the quantity of *such* timber growing in hedge-rows ?

*A.* The timber in the hedge-rows is decreased, owing to the circumstances mentioned in the next answer.

*Q. 4.* Whether the growth of oak timber in hedge-rows is generally encouraged, or whether the

the grubbing up of hedge-rows for the enlarging fields and improving arable ground is become common in the county?

*A.* From the conversion of pasture land to arable, the enlargement of fields, and above all, the mischievous practice of both the farmer and the poor, of trimming up, and cutting off all the lateral branches, the trees in the hedge-rows are few and little worth in many places.

Q. 5. Whether in such oaken woods as are cut at stated times in succession, it is customary to leave young saplings at each cutting? and if so, whether they are generally barked at the second fall and cut down for country uses, or preserved for timber?

*A.* There is in every part of the county proper attention paid to the leaving young saplings, which are never barked at the second fall, nor felled for country uses: Fir being in almost general use, except when oak is absolutely necessary.

Q. 6. Whether the improvement of roads and the navigable canals, made during the last thirty years, have not, by reducing the expence of carriage, been the means of bringing large supplies to the Dock-yards, which could not otherwise have been brought there?

*A.* The

*A.* The timber in this county was always well situated for removal, and though the roads are much better than formerly, yet the price of land carriage is increased from 3d. to 6d. per load, per mile, within the last 20 years, which may be accounted for from the high price of horses, the extra charge of keeping them, and other fundry reasons. There is no navigable canal in the county, nor have larger supplies of timber been sent to the dock-yards on the above accounts.

*Q.* 7. Whether of late years greater quantities of timber have not, in consequence of this increased facility of carriage, been felled in those parts of the country which were before inaccessible, than they will be able permanently to supply?

*A.* There are few or no parts in this county which are, or ever were inaccessible, nor any greatly increased facility of carriage; therefore no greater quantity of timber has been felled on those accounts.

*Q.* 8. Whether the general consumption of oak timber for building, or other uses, within the county, is increased or diminished; and to what cause in your opinion is such increase or decrease to be imputed?

*A.* The

*A.* The use of oak timber for building, &c. is certainly diminished, for the following reason, to wit, from the cheapness of fir-timber, and the great ease with which it is worked, and converted to use.

Q. 9. Whether the price of oak timber, for carpenters or other uses, is increased within the last 40 years, and in what proportion?

*A.* The price of oak timber for carpenters and country uses, is very little, if at all, increased within the last 40 years, for the reason mentioned in the foregoing answer.

Q. 10. Whether the improvements of roads, and the navigable canals, have not introduced the use of coals in parts of the country, in which wood was before generally used for fuel? and whether in such parts the demand for underwood, and the value of it, have been increased or lessened?

*A.* The use of coals is much more general than formerly, partly perhaps owing to the improvement of the roads, but more to the decrease of pollard trees and hedge-rows: the value of fire-wood is somewhat increased.

Q. 11. Whether in those parts of the country in which underwood is more valuable, in consequence

of a demand for hop-poles, or from other causes, it has become the practice for many years more than formerly, to cut down the great timber-trees on account of the injury they do to the underwood ?

*A.* There are few or no hops grown in this county; and the great timber-trees are not more cut down for the benefit of the underwood than heretofore.

Q. 12. Whether there has been a greater quantity of woodland, formerly producing oak, converted to tillage within memory, than of land of a fit soil newly planted with oak ?

*A.* It is generally thought, there has not for upwards of fifty years back.

Q. 13. Whether the plantations which have been made within memory, have been chiefly of oak, or of the kinds of trees not fit for the navy ?

*A.* From about 20 to 40 years back, Scotch fir, and other soft and ornamental wood, were much planted: since that time, oaks have been much more planted and sown.

Q. 14. Whether there are any commons, or commonable woods, of considerable extent in the county ?

county? and whether the quantity of timber growing in such woods or commons is considerable?

*A.* There are not many waste or commonable woodlands of any considerable extent in this county; and the quantity of timber in those few which there are, is not considerable.

Q. 15. Whether the timber in such commons or commonable woods, is well preserved, or suffers great depredation and waste?

*A.* What few timbers there are, seem to have little care taken of them; in general they suffer much depredation.

Q. 16. Whether on such commons or commonable woodlands, as have been divided and inclosed, any considerable quantities of wood or timber have been raised?

*A.* The commons and commonable lands which have been inclosed, have been either large arable fields, or pasture land, which has been chiefly on its inclosure converted to arable: of course no great quantity of wood can have been raised in them.

Q. 17. Whether a further division and inclosure of such commons and commonable woodlands,



would in your opinion be the means of increasing the quantity of wood and timber?\*

*A. A division and inclosure, under proper regulations, might possibly be the means of increasing the quantity of timber; but unless there was some compulsory clause inserted in the act to set apart a certain proportion for the growth of timber, such lands would chiefly be used in tillage.*

#### GENERAL OBSERVATIONS.

The growth and improvement of oak timber, is certainly a matter of so much consequence, and of such great national concern, that the want of it cannot be too greatly dreaded, or precautions for the prevention of it too soon adopted: however, at present there does not seem to be in this county any just ground to apprehend the want of it, at least of small timber. The only two ports of note here, for building and repairing ships, are Yarmouth and Lynn, in which there has been no alteration in the price of timber for many years, excepting only small *occasional* fluctuations in it. And if the price of large oak timber has in the kingdom at large increased (as it is said to have done) from 7s. 6d. to 10s. per

\* Any further observations or information, on the subject of the preceding questions, will be very acceptable.

Dated, Land Revenue Office, Dec. 20th, 1790.

load, it should at the same time be remembered, that the consumption of oak timber between the years 1777 and 1783, six years only, was more than for the preceding 23 years. In the year 1783, I have been informed there were 43 sail of the line, and 52 forty-gun ships building in the public and private yards; besides ten East-India ships of 900 tons each.

---

## ARTICLE V.

*On MOWING CABBAGE.*

TO THE SECRETARY.

DEAR SIR,

THE manner in which the gentlemen of your Society have always received those few articles of intelligence which it has been in my power to communicate to them, is expressed by you in such terms, as to impress upon me the highest sense of their candour, as well as of your polite and most friendly disposition towards me. I wish I could flatter myself, that I had ever been, or could yet be deserving of their and your esteem.

By a note inclosed in your last letter, you tell me that a gentleman had been with you, wishing to know, whether the mowing Cabbage had been

found by me to shoot again, after having been *fed down*; to which, I am sorry to answer, that it did not do so with me, in any such degree, as to make it worth preserving for that purpose: when I say that I am sorry to answer so, it is because, had the result of the trial been otherwise, the cultivation of those plants would have been an invaluable practice, on such hot burning soils as will afford little or no grass in the summer season. However, it must be observed, that mine were fed down by sheep, perhaps too closely, and that the very few sprouts which afterwards appeared, were, I believe, some of them eaten down by the hares.

The answers to the queries, which I transmitted to you in my last letter, were such as, on the most exact and strict enquiry, I could obtain from the principal timber merchants, as well as from the best informed gentlemen of this county; and I have reason to think may be fully relied upon. I have the satisfaction to be able to add, that the propagation of oaks, by sowing the acorns, and planting young trees from the seed-beds, is now frequently and extensively practised here by gentlemen in their ornamental and other plantations.

I am, &c.

THOMAS BEEVOR.

*Hetbel, Jan. 7, 1792.*

## ARTICLE VI.

*On Accuracy in the Characteristick Distinctions  
of Plants, &c.*

TO THE SECRETARY.

DEAR SIR,

IN almost all the communications of new discoveries and experiments, particularly in agriculture, it has been observed, that the first publishers of them are so apt to see, and represent them in a flattering light, that the public, perpetually deceived and disappointed in their high-raised expectations, becomes sceptical, and even averse to all trial of them. Would Gentlemen, therefore, be satisfied, with barely relating, and with due precision marking, the several respective disadvantages, as well as the advantages attending the culture of the particular plants they judge proper to recommend to notice, we should much seldomer hear the reproachful terms of speculative and visionary triflers bestowed upon them. What has led me to make the above remark, is, that amongst all the plants lately recommended for the winter food of cattle, (to wit, the Mangel-Wurzel, Turnip-rooted Cabbage, Ruta-Baga, Mowing-Cabbage, and Cow-Cabbage) none of their particular properties have been so discriminated

criminated and fairly stated, as to have left the cultivators without some considerable share of disappointment, in the proper use and value of them. To do this justly, I feel myself so very incompetent, that I shall leave the task to others better qualified, and of more leisure, resting contented with having furnished the hint only. To explain my meaning, I would, for instance, have it mentioned among their other properties, (if by experience it should be found to be so,) that the Mangel-Wurzel will not endure our frosts, if left in the ground during the winter;—that the Turnip-rooted Cabbages will resist the severest frosts, but are attended with very great trouble and expence to get them out of the earth; that when taken up they require to be cut to enable the cattle to eat them, and should be used only the last of all other green food, which they will well supply, until there is a sufficiency of grass;—that the Ruta-Baga plants, though they appear to afford the sweetest and most nutritive food of all the roots, and though the value of the root has been found to be little or nothing diminished, even after it has borne its seed, yet will it not abide the severity of frost much if at all better than the common turnip;\* to which may be added, that one considerable advantage attendant upon them, as well as the Turnip-rooted Cabbages, is the vast abundance of food they  
each

each of them supply by their bushy tops in the spring;—that the Mowing Cabbage seems better calculated for culinary uses, than for cattle;—and that the Cow Cabbages, to pay the greatest profit, should certainly be all spent before Christmas.

Of the justice of all the above hints, I will not presume absolutely to vouch, but that they have appeared in such a light to me, I will venture to say; and as the sole design of this letter is but to invite better and fuller information; if that end be obtained by it, it will not have proved quite useless, although it should be thought not void of mistakes.

I am, Sir,

With great regard, your's,

THOMAS BEEVOR.

*Hethel, March 1, 1792.*

\* N. B. On the strongest part of the soil they have, with me, grown the largest, to upwards of four pounds each; and contrary, I think, to the common turnips, they rot universally from the tap-root upwards, so that all of them above ground appear and prove to be quite sound, and uninjured by the frost, whilst almost all the part in the earth is quite decayed, and a mere pulp.

OBSERVATION. *The weight of this plant, as stated by Sir Thomas, we find to be far below the average weight, produced on the strongest lands in other parts of the kingdom.*

## ARTICLE VII.

*On the best Method of planting MANGEL-WURZEL, and of its Use and Value for feeding Pigs, Cattle, &c.*

TO THE SECRETARY.

SIR,

I Apprehend the best and most acceptable return I can make your very respectable Society for the Mangel-Wurzel seed you were so kind as to send me, will be to send them a particular account of the method I used in the culture, and the uses I applied it to, with my observations thereon. It was the beginning of April when I received the seed; as I had no ground ready for sowing, it was the 13th of the same month before I could put it into the ground, which was by no means in fit condition for sowing; but as the season was already too far advanced, no time was to be lost. I had the ground ploughed up in two-bout ridges, which makes them about three feet wide from the middle of one furrow to that of another; the tops of the ridges about two feet, and the furrow or interval between them one. By this method the mould on the ridges was laid considerably thicker, which is a great advantage to tap-rooted plants of every kind. My method of planting was as follows:

I have

I have a short cylinder, or rather roller, made of oak, about two feet long, and 14 or 15 inches diameter. The length is divided into five equal parts, and in the circumference of each is inserted a circular row of wooden tines or pegs, exactly six inches distant from each other. They were cut out of spine oak an inch and a half square, bluntly pointed at top, and project about three inches from the surface of the roller. This instrument, being drawn along upon the middle of a ridge, indents the same in five lines, with holes exactly six inches every way from each other. I began with planting three rows out of the five in each ridge, that is to say, the middle and two outside ones. This was done by dropping two seeds in each hole. The rows then are one foot asunder, and the seeds in the rows just six inches.

When one ridge was planted in this manner, I thought the plants would be much too near, and the intervals too narrow for horse-hoeing. In the remainder of the ridges, therefore, I only planted two rows, next the outside ones, leaving out the middle and the two outside ones, and in the rows passed every other hole, so that the plants would now stand a foot apart in the rows, and the intervals were two feet wide, which was quite sufficient for horse-hoeing.

At



At length the plants came up very regularly and well; but the ground having had but one ploughing, the weeds very soon overtopped them. Women were then set to work to weed them by hand, which they performed very completely. The plants at that time made a wretched appearance; but in less than a month after were indeed very promising. The weeds came up again very thick, and grew fast; the hand-hoes were then set to work, and immediately followed by the horse-hoe. This left them very clean, gave them fresh well pulverized earth, and from this time they grew very rapidly.

In July the outside leaves seemed to have attained their full growth nearly; they were therefore plucked off, and given to the pigs.

This mode of planting succeeded very well, yet I think it is capable of considerable improvement. When I plant this article again, I will have the ground ploughed in ridges of the same size as before; but instead of two or three rows, I would have but one, which should be exactly in the middle of each ridge, the spare ground then between the rows would be a yard wider, which would admit of the horse-hoe being worked very freely. The seed should be dropped eight or nine inches apart, and  
one

one good seed only in a hole. Supposing all should grow, then the plants would stand three feet row from row, and at eight or nine inches distance in the rows; but this would be just double the number of plants necessary; for 16 or 18 inches is quite near enough. Sufficient, therefore, might be drawn from these, to supply the deficiencies that would necessarily happen from imperfect seeds, &c. and if not wanted might be easily cut up with the weeds in hand-hoeing, for they should by no means be suffered to stand too thick.

I have at this time some plants in a very thriving condition, which were transplanted; and though in general I have no great opinion of transplanting tap-rooted plants, especially such whose roots constitute the principal part of the produce, yet I know not if, upon the whole, this would not be the most profitable method of cultivating this plant. In that case, the seeds should be sown in a nursery-bed as early in March as the season will admit, and in the interim between sowing and transplanting, the ridges should be well prepared for the reception of the plants. The advantage of being removed into a clean well-pulverized soil is great indeed, if a favourable season be taken for that business! It is the method I have followed several years with the  
turnip-

turnip-rooted cabbage, and I am well convinced it is the most profitable and œconomical of any usage in practice.

It may, perhaps, be thought by some too laborious and expensive, but if they would make the experiment, they would soon be convinced of the contrary. A dexterous labourer would set a large piece of ground in a day, and when set they would be done with, all but weeding; for being planted at due and regular distances, the whole of the operation at once is finished. But if the seeds are sown or dropt, the plants must be set out to a proper distance, which would be found to be as expensive as transplanting, and the ground by no means so clean and in such perfect condition as it must be made for transplanting. The difficult question is, whether the roots of the transplanted would be equally fine with those which had never been removed. This, from some observations I have made, seems to depend much upon the age and size of the plants when they are removed. The root in its first growth pretty much resembles the carrot, and if it be drawn when not above three or at most four inches long, and the hole in which it is to be planted be made deep enough to receive it without bending or distorting it, the root will receive no injury;

jury; but if it be bent, broken, or twisted, it will certainly occasion an unnatural shape, and I should fear diminish its size.

Being planted in this manner at the distance of three feet row from row, the intervals by horse-hoeing may be kept perfectly clean, and the ground between the plants equally so by hand-hoeing. The soil then would be in a most desirable state for a crop of barley the spring following.

In the next place, I propose to give some account of the crop and its beneficial uses. Between July and November, both inclusive, the leaves were cut three times, and a plentiful crop there was at each cutting. We began with plucking off the outside leaves, but this was soon found too tedious and troublesome. I therefore ordered them to be cut clean off about an inch above the crown of the root. This is a necessary precaution, for if they are cut too close, the rain lodges on the top and rots the root. A dextrous labourer with a sharp knife with a long blade would cut enough for a great many hogs in short time.

The last winter was very mild, and neither the herbage nor roots suffered any injury from frost,

frost; indeed they put forth fresh leaves through the winter; therefore I did not take up any of the roots till the end of December; I then caused about half of them to be taken up, piled in a heap in the barton, and covered them over with straw. This preserved them till the time came for planting them out for seed. The other half, left in the ground to stand for seed, is now (in August) vigorous and healthy, and promises a large quantity of seed, as do those also which were transplanted; but they do not stand so firmly in the ground as those that were not removed. I am next to speak of the uses they were put to.

The leaves were cut every morning, and given fresh to the pigs two or three times a day. It is not easy to describe how voraciously they ate them. I know no food they are equally fond of. Even the hogs that are fattening would often leave their pease and barley-meal, to feed on the leaves of the Mangel Wurzel. The cows also ate them with an exceeding good appetite, and were certainly very desirous of them. After harvest the weaned calves were turned into the field, at one end of which they grew, they soon found them out, feasted deliciously upon them, and were manifestly improved by them.

During

During the time the plants were growing, I often gave a few of the roots and greens together, but neither cows or pigs were at all fond of the roots, in that stage of their growth; they always left the greatest part of them. This circumstance alarmed me; but was entirely done away in the winter, for then both cows and pigs ate them as kindly as they would have done any food whatever. The roots in general were so hard and firm, that I found it necessary to have them cut in slices, which a labourer did with a small bill-hook on a trefפל, and could cut several bushels in an hour.

The greatest inconvenience that attends them is the great quantity of mould that so firmly adheres to them. The roots are covered with innumerable fibres, which embrace the mould too firmly to be easily separated from it. This is a matter of no great signification in feeding hogs, who are constantly delving in the dirt; but perhaps it is not quite so clear that in time it might not prove injurious to cow cattle.

As my cows and pigs were fed with them promiscuously together with other food, I am unable to ascertain what would be the amount of the produce on any given quantity of land valued in

money; but I am pretty certain, that an acre of land planted as above, would well maintain twenty store pigs from six to eight months, and in that time their improvement could not be less than 14 or 15s. a pig. The labour of preparing this article of food would indeed be a considerable deduction from the sum, whatever might be the amount. However, at all events, it must be allowed to be a very valuable article of culture, and well worthy the husbandman's attention.

I am, Sir, your's, &c.

JOSEPH WIMPEY.

*Bockhampton, Aug. 10, 1790.*

*P. S.* I observe Sir Thomas Beevor's account of the Mangel-Wurzel (Art. 36. vol. 5,) is by no means so favourable as the above. More than half of his plants were not found and fit for use in March. Whereas mine, especially those left in the ground, were not injured at all by the cold of the winter. The last winter, it is true, was uncommonly mild, but I fear, indeed, that they cannot bear the severity of a hard one. From Sir Thomas's account in a former paper, of the superior size of his, I should apprehend

apprehend his soil is richer and moister than mine. He says (I think) that some of his were 18 inches in circumference, and upwards; whereas the largest of mine were not more than 14 or 15; but the far greater part were only from 10 to 12. My soil is gravelly and dry, which seems not favourable to the large growth of this root, but then it is less susceptible of frost, and probably for that reason they were not so liable to be injured by it. The stems of some of my plants are now seven feet high, and nearly as thick as a man's hand-wrist. The seeds seem nearly of a full size, but are as green as ever, and I think will not be fit to cut these five or six weeks. At all events, I think this plant would afford a very large quantity of desirable food for six months out of the twelve, (say, from the beginning of July to the end of December) and in a favourable season, two or three months longer. But in severe winters I am afraid there can be no dependance upon it after Christmas, unless means similar to those used to preserve potatoes be adopted for their preservation.





## ARTICLE VII.

*Of the Cause of the Smut in Wheat.*

In a Letter to the SECRETARY.

SIR,

**I**N a former paper on this very difficult subject,\* I observed, it was no unusual thing to meet with ears both of smutty and sound corn issuing from the same root. Also, that it frequently happened that smutty and sound grains were to be found in the same ear. That I had then by me the corn I had picked out of such an ear. It contained forty smut balls, 21 grains that appeared to be perfectly sound, and five grains which had one end black and smutty, and the other sound. These I made the subject of experiment, the result of which I now beg leave to lay before the Society for their consideration.

On the 2d of September 1789, I put the twenty-one grains abovementioned into a two-ounce phial of pump-water, which I very well shook together. It was then set by till the next day, when the water was poured off, and the corn divided into two parcels. Having filled a two-quart garden-pot with common mould, ten of the grains were set in five

\* Article xvii. vol. 56.

holes about two inches deep. The other eleven grains were returned into the phial, being first nearly filled with a strong pickle of salt and water. After standing 24 hours, these were also set in a garden-pot, in all respects similar to the other. My intention in these different processes was to discover, 1st, if corn from a smutty ear, merely by rinsing in simple water, would produce sound corn free of smut; and 2dly, if a strong solution of salt and water would more effectually answer that desirable purpose, as was generally believed and insisted on.

The beginning of December I observed the plants seemed much crowded, and wanted more sustenance than the small quantity of earth the pots contained could supply. On the 8th day, therefore, I took them out of the pots, and planted them in a row in the field, about eight inches apart, keeping, however, the plants of each pot separate. There was no perceivable difference in the plants, both pots had shot vigorously, and it was truly amazing to see the immense quantity of roots the pots contained; the sides being completely lined, with the same running round and round, to an incredible length, from whence it seems very probable, that the roots of wheat in good land, well pulverized,

may extend and collect sustenance at some feet distance from the parent seed.

At this season vegetation is nearly at a stand. It was the end of March, or beginning of April, before the plants began to shew the least appearance of recovery from the check occasioned by transplanting: however, they then began to shoot vigorously, and at length acquired an uncommon degree of strength, length, and size of ear and plumpness of grain, and from 12 to 24 offsets, or stalks from each plant. I reckon I am much within compass in supposing that the produce of these 21 grains was not less than 15,000, and the grain as plump and fine as ever I saw, and every corn perfectly free from smut. It would be ridiculous to suppose, that this corn was in any respect better than it would have been from sound and perfect seed. Its extraordinary vigour I impute solely to its being transplanted into fresh ground, well pulverized, which could not fail to give much additional sustenance and strength to the plants, and would probably afford the greatest produce possible on any given quantity of land. But I am sensible it could never answer the extra expence, nor be at all practicable on a large scale, notwithstanding some mere speculative men have wildly imagined the contrary.

From

From this account, it is as certain as experiment can make it, that a smutty crop of wheat is not the necessary result of sowing seed from corn that is smutty ; nor that it owes its corruption to any vicious principle or defect in the seed. In this experiment we see the seed, rinsed or soaked in simple water, produced as clean and perfect grain as that which was soaked in a strong solution of salt and water ; and therefore were not in the least tainted by the smutty grains in the same ear, nor at all affected by the cause, whatever it was, that vitiated them ; or if they were, that the soaking and rinsing in simple water was as effectual to the preservation of the crop from smut, as the strong pickle. But it is a truth universally known from experience, that in unfavourable years corn is generally smutty, notwithstanding brining, liming, and every precaution hitherto used to prevent it. From all which it clearly appears, that the general cause of the smut does not exist in the seed, but is owing, if not altogether, yet in a very great degree, to some vitiating principle in the air, a constant concomitant of cold, wet, stormy, tempestuous summers, which are ever attended by smutty crops. My reason for supposing the smut may sometimes possibly be derived from the seed will appear hereafter.

In the above experiment, one thing occurred which I must not omit, for it well deserves to be noticed. One part of the seed was soaked in clear water only, the other in a strong solution of salt and water. I could perceive no difference in the plants on a comparative view, from the time of their first coming up to the maturity of their growth, except in their tillering. The plants in both experiments were equally vigorous, equally tall and strong, the ears equally long, large and full, and the grains equally plump and heavy ; but those steeped in the brine tillered out considerably more, that is, put out many more stalks, than those steeped in water only ; consequently were much more productive. What the superior fructification was owing to, is well worth enquiry. The seed was out of the same ear, and though set in two different pots, it was in the same earth, and transplanted into the same ground ; the culture in every respect the same ; the only difference was, in one the seed was steeped in clear water 24 hours, and then planted; the other, after being steeped 24 hours in the same water, was steeped 24 hours more in salt and water. The question is then, and a very interesting one it is, whether the superior fecundity of the latter was owing to the seed being steeped twice as long as the other, or to its being impregnated with the salt  
used

used in the solution, or to some secret cause not discovered, and possibly not capable of being discovered, by the experimenter.

By repeating and varying these experiments, it would be easy to discover, whether fertility is promotable by steeping a longer or a less time in water; and 2dly, if water in which a good quantity of salt has been dissolved, does not encourage and promote vegetation more than simple water?— If it should be found to do so in any considerable degree, I cannot have a doubt but a strong lixivium made of wood ashes would promote it much more. I have always been of opinion, that such menstruums were useless, or at most, that their aids at best extended no further than the first rudiments of plants; but the fact recited above strongly inclines me to repeat the experiment, in order, if possible, to fully ascertain the facts.

In the next place I propose to give an account of an experiment made with the five grains mentioned above, which were smutty at one end, and sound at the other. These were set in a small garden-pot like the former, one of which only came up. In the spring it seemed to want more room; I therefore dug a hole in the ground, and, taking the  
mould

mould out whole from the pot, it was planted in the same without disturbing the roots. It soon grew vigorously, but never had the healthy and robust appearance of the former. It had always a sickly greenish yellow look, which betrayed its malady; notwithstanding its stems grew to a good height, and tillered surprisingly. I counted 24 ears from this single grain, most of them of a good length, but lank and thin, very unlike the appearance of those smutty ears which are not affected till the blowing season; for these very often are the finest and plumpest ears in the field, till that time.

Of these 24 ears, 23 of them were entirely smut not a sound corn could be found among them. The other was quite a small underling ear, which did not appear till a full month after the other, but always bore a healthy countenance. This ear produced 14 corns only, and those small and thin, but sound and perfect. These were planted again last August, and are now as fine and promising as any corn in the field.

From this experiment it seems to appear, that a grain which is vitiated with the smut, yet has enough of the vegetative principle sound to enable it to grow, infallibly produces smutty grain. That one ear,

ear, and one only, out of 24, should be found, is indeed very strange; but perhaps not more so than that, in the animal creation, the offspring of a dis-tempered sire may in general be affected by the vitiated stamina of the sire, yet some one or more may escape the hereditary taint, and appear perfectly sound.

From these, and the experiments of the former paper, the following corollaries are clearly deducible:

1<sup>st</sup>. That sound grains, from very smutty ears, produce as clean and as sound crops as seed from corn that is perfectly free from smut.

2<sup>dly</sup>. That seed from the soundest and cleanest crops doth frequently, in wet, cold, unfavourable seasons, produce smutty crops, in spite of steeping, brining, liming, change of seed, and every device and invention which the wit of man hath ever practised.

3<sup>dly</sup>. That in fine, dry, warm summers, it frequently happens there is little or no smut at all, and that in many instances, where smutty seed has been sown, the produce has been clean and perfectly free from the smut.

4<sup>thly</sup>. That



*4thly.* That the smut is not an hereditary disease, proceeding from a corrupt or vitiated stamina in the seed, but usually and almost entirely occasioned by some blight or vitiating principle in the atmosphere, which corrupts or destroys the vivifying principle, at the time of its blowing and fecundation.

*5thly.* If the smut ever proceeds from distempered seed, it can be only from such as hath the germ or seminal principle sound and entire; for mere smut balls are as incapable of vegetation as powder of poſt, or the moſt effete matter in nature; but this is a caſe ſo rare as not to be adequate to the production of a millionth part of the ſmut that happens; therefore it muſt generally proceed from ſome malignant principle, which at ſome ſeaſons ſubſiſts in the air.

*6thly,* and laſtly, If the cauſe of the ſmut does not ſubſiſt in ſome latent or occult corrupt principle in the ſeed, but is generally occaſioned by the intemperance of the air, ſix or eight months after the ſeed was ſown, it ſeems perfectly nugatory to uſe any means to remedy or prevent a diſorder, which has no exiſtence, even in its cauſe, and moſt probably may never happen, unleſs it could be made appear, that ſuch means beſtowed ſuch a degree of  
ſtrength

strength and vigour to the plants, as might render them less susceptible, of any malignant impression from the atmosphere, which might happen to reign during any future stage of their growth.

I have now several more experiments in prosecution, having set many small quantities of sound grain, picked from smutty ears at different times. At present they all appear very promising, but the result cannot be known till the next harvest, when, if found interesting, I may probably request leave to lay them before the Society. I am, Sir,

Your much obliged servant,

*North-Bockhampton,  
Dec. 21<sup>st</sup>, 1790.*

JOS. WIMPEY.

#### ARTICLE IX.

##### *On the DRILL HUSBANDRY.*

DEAR SIR,

**Y**OU will probably be much surprized to hear, after so many years practice, I should not yet be able to make up my mind respecting the best, that is, the most beneficial mode of practising the  
Drill

**Drill Husbandry.** But practical husbandry is attended with such a variety of circumstances, and those so differently combined, that the same method of practice is often attended with such different success, as puzzles and perplexes the agent, and leaves the judgment in doubt. I am at this moment at a loss, whether it is best to drill wheat in single, or in 2, 3, or 4 rows. I have tried them all, but what I have generally practised is drilling on three-bout ridges, 3 rows, 11 or 12 inches asunder. Three bouts form a ridge about  $4\frac{1}{2}$  feet broad; three rows, at the distance above, occupy 2 feet, and the horse-hoe running along the side of each outside row, at about 3 inches distance from the same, leaves the ridge  $2\frac{1}{2}$  feet broad, and the intervals between the ridges about 2 feet. This has been my usual method, which has commonly succeeded well; but as I have constantly observed that the outside rows are by far the strongest and most vigorous plants, I am much inclined to believe that two rows only on two-bout ridges would be as productive, and leave the ground in better condition. However, as the same machine will sow any number of rows from five to two, every person may determine for himself. I will therefore get one made as soon as I conveniently can, and send it as you direct; though I am some-  
what

what afraid I may put your patience a little to the stretch, but it shall be as little as I can.\*

I am &c.

*North-Bockhampton,*  
*May, 1791.*

JOS. WIMPEY.

#### ARTICLE X.

*On Field Mice, and the Transplantation of Wheat.*

GENTLEMEN,

**I**T sometimes happens from heavy rains, and long continuance of rain following a late harvest, that the lands intended to be sown with wheat are not in proper condition to receive that grain; prevented by this circumstance, such land may yet be in reservation for a favourable period in the ensuing spring, for the reception of autumnal sown wheat; and I have reason to believe, from the following experienced process, that no signal disadvantage would result from such a necessary prevention.

In the spring of this year, as well as at equal periods, many years past, I observed in many sown

\* This promise has been performed.

fields,

fields, large tussocks of bladed wheat, which I knew arose from the reservoirs of corn collected by the field mouse; which tussocks either sprout from her magazine when saturated by rain, or more probably by the death of the architect.

I took a part of two or three of these tussocks matted together at the roots, and divided them singly, or rarely left more than two roots conjoined; I placed them in dibbled holes, on a fresh turned-up bank, much under the same regulation as the practice of dropping wheat in Norfolk; with this difference only, by a slant direction of a shorter dibble pressing the earth to the fibres.

I had the pleasure of seeing that these generally succeeded; though not in a soil so well adapted for wheat, as that whence these clustered parcels were taken; yet they are now prosperous in ear, with a full fathomed grain, as those in the field from whence they were extracted.

Perhaps expectation from the hoards of the field mice, which yet with us seems every year certain, would be a too precarious dependance: still a certainty might be derived from thinning a proud produce (which would be mended by its reduction) or  
an

an unfailing one procured, by thickly strewing as many pecks of wheat on a plot of ground as there are half acres in contemplation for planting; which quantity I am persuaded would be more than sufficient, were such an assigned space guarded from the depredation of birds, and the inroad of mice.

Perhaps it may not be useless to give a sketch of a history of this delving animal: not merely as illustrative of the foregoing plan of planting, but to point out an early mode of diminishing its numbers, which remove more seed corn than the husbandman is aware of; I believe frequently more than the winged ravagers which he is often on his guard against. The sketch of history I propose, is suggested by having been frequently of a party, with other school lads, in traversing the stubbles for the habitations of the field mice, from which excursions we rarely returned without numerous captives. Our signal of discovery was a small heap of mould, thrown sometimes by, and oftentimes over the first entrance of their runs; generally at uncertain distances, there were other holes; sometimes many screened by thickets of stubble or weeds; these when we found we stopped up; and then traced their avenues from the first entrance through many winding paths, a little beneath the surface; at other times it led to a

cell containing their nest, sometimes with callow young, but more frequently the half-grown progeny were gone off with the old pair to the extremity of their runs. To avoid what might be deemed a puerility of description, I shall remark in point, that on one side of their avenue, in a larger space than where their nest was formed, there is ever to be found, if we sought for it, a reservoir of corn: I think I distinctly remember having nearly filled my hat with this treasured provision.

The lately adopted mode of husbandry has a certainty in unsettling, but not reducing the number of these corn-devourers; a means somewhat similar to this boyish amusement must be adopted to prevent their ravages. By the present mode of husbandry their dwelling is broken in upon, but its inhabitants continue; when the plough breaks in upon their runs, they have a long period before it crosses the extremity of the space, when they must necessarily fall; and it should seem they more generally possess themselves of the newly sown fields of wheat, where they fill new magazines with its grain,\* secure from

\* In the intermediate period from the exhausting of this corn, I have reason to believe their subsistence is acorns and beech masts, having found, on the margin of a corn field, carried deep into the earth, a considerable quantity of the former; and last year had the mortification of observing, in a piece of land dropped with acorns almost every hole opened during a few nights.

destruction, safe from the talons of the owl; and here, after they have exhausted their magazine, for months they find subsistence from the earliest green formation of the grain to its state of maturation, at which period it is manifest they breed numerously. Our laws and the occupiers of land have set a price on a winged species of pillagers; while these scarcely obvious subterranean destroyers pillage with secret and more certain destruction; and the farmer's undoubted friend, and their natural enemy, the owl, is rarely protected, and too easily permitted to be wantonly destroyed.

But to drop these remarks; permit me to urge the principal object of this communication, by repeating, that a small portion of wheat might be thickly sown at the usual period of sowing, and transplanted early in the spring to ground to be prepared, and then ready for its reception; and if this be done with equal attention as wheat is dibbled, I am confirmed in opinion, from the foregoing experiment, that its produce will be little if any thing inferior to what results from a common sown crop.

Your friend respectfully,

JOHN WAGSTAFFE.



## ARTICLE XI.

*On the Grafting Crab-Stocks, White-Thorns, &c.  
with Apples and Pears.*

GENTLEMEN,

HAVING had a pleasure in grafting, I some years since practised it upon some forward stems, in a layer of crab-thorn, the side of a new inclosure, which layer had been laid in about three years before; these stems I grafted with divers species of apples, and had the pleasure of remarking, that about two-thirds of my grafts succeeded; from thence I entertained the expectation, that in a subsequent year or two the uningrafted might be cut down to form the quick hedge, and the ingrafted grow up at the requisite distance, and form a row of useful trees; but my object was defeated by the ungenerous or selfish notice (I conceive) that was paid to my success, as most of these grafted stocks (they being at a distance from my house) were taken away, and to preserve the few remaining, I was obliged to take them up myself. Though stopt in this progress on my crab-tree hedge, at the approach of the spring of last year (1790) I pitched on a white-thorn hedge, of many years growth, the boundary of a garden, and marked at due distance many of its

its strait and smooth-barked stems, and ingrafted them with scions from various pear-trees, which rather more generally succeeded than the apple scions in the first experiment; and in the course of the summer of that year, some of them shot from 24 to 40 inches. The success of these excited me to a farther trial in the spring of this year, and with equal success in their certainty of taking, though they are not quite equal to the luxuriance of the summer shoot in their predecessors of the former year. Those first ingrafted have improved on their former years vigour, in the additional length of their shoot, and increased thickness of their stem, while the size of their spurs indicates, to my conception, a probability of throwing out some blossoms in the ensuing spring. I may remark that one of the first ingrafted, I removed to the side of a wall, which removal it scarcely felt; as the first spring shoot was thirty-eight inches, and the next year's shoot measured twenty-nine inches; and this sum of five feet seven inches from a white-thorn, that after many years growth had not shot in bole four feet from the ground. I am therefore persuaded, on the foundation of these premises, that in any future inclosure of land, peculiarly those inclosures that may be in contiguity to a habitation, hedges formed of either or both these species of thorns grafted, (and better fences of quick

K 3

growth,

growth, I conceive, have not hitherto been planted) or the grafting at proper distances of their most promising and vigorous stems, may be highly useful. Any extent of a partitioned farm may be thus advantageously inclosed, and such partition-hedges thus ingrafted. Perhaps the system may be more advantageous in a small than a large farm. Each of such boundaries might be productive of fruit, in the same proportion with an equal number, and same species of trees planted in an orchard, and that without diminution of the growth of corn, or any reduction of summer or winter forage, and a more sheltered pasturage might continue the cattle longer abroad. Thus the necessary, but commonly barren fences, may be rendered subservient to a pleasurable prospect, and the supply of a considerable portion of food to numerous families; and in a year favourable to those fruits, the making of a beverage grateful to most, necessary to many, and to thousands of our fellow subjects their most natural draught.

I had more to have said, relative to pears; but as these remarks are already extended to a length that might demand an apology, I shall respectfully postpone for your future judgment, what I wish further to offer respecting this fruit.

*Norwich, Dec.*

Your friend,

*26th, 1791.*

JOHN WAGSTAFFE.

## ARTICLE XII.

*On the saccharine Quality of Pears, Maple-Sugar, &c.*

GENTLEMEN,

**M**Y last letter to you, contains an account of certain experimented facts; by which the boundaries (the hedge-rows) of the field might be made useful to the supplying a large portion of edible fruit, without any injury to the fence, or diminution of its arable product.

But what I have now with submission to propose, concerning one species of fruit, viz. pears, is hitherto, I conceive, unexperimented; but which, under the encouragement of your society, may become not merely a succedaneum for sugar; as in several instances, which I shall take the liberty of reciting, it has effectually supplied, but under somewhat of a chemical process their saccharine extract may possibly be granulated into its absolute substance,

The fluid extracted from a species of maple, perhaps two\* of the maples of America, may be adduced in certain evidence, that sugar is not the produce of the cane only, as it is generated from the

\* The *acer saccharinum*, and *acer regundum*,

maple tree in substance and quality not distinguishable from the product of that plant.

Now the action of fire on pears, in the common culinary process, gives even to the most austere of this fruit a saccharine quality: I have had different species of pears, some of them hard, stoney, and unpalatable, baked at different times; all of which, when duly baked, are more or less replete with this quality, inasmuch that their pulp, added in a proportion of about a fourth or fifth part to apples baked in small pies, gives the required sweetness, and it has seemed to me pleasing to every palate as though sweetened with sugar: the same requisite sweetness is likewise communicated by the inspissated juice in which they are baked, which juice or syrup is formed by a portion of beer or water put to the pears before they are put into the oven; and which seems to attract the native juice of the pear, in a larger proportion than what might flow if baked without an added fluid. This apparent syrup impresses the palate with the sweetness of real sugar, and which imparts to milk and the acid pulp of apples, its sweet quality, not distinguishable in these subjects from what it is used for.

I therefore cannot but find myself interested, in earnestly wishing that some encouragement might  
be

be given, to ascertain whether such a substance as sugar is not obtainable from this luscious fruit when thus prepared by fire. I need not add, what I conceive must appear from what has preceded, that in some instances it may serve as a succedaneum to lessen the consumption of what is now, by the manner of its being obtained, become obnoxious to the public sensibility; and the extracting this quality from a fruit easily propagated, (congenial, if not native, to our climate) will in its consequence be favourable to the interest as well as convenience of this kingdom.\*

I wish to add to what I have mentioned in my former communication on this subject, of the mode in which this fruit may be propagated, and in addition to hawthorn stocks, observe, that they take with known facility upon the quince, the stocks of which may be easily propagated by their cuttings.

I farther wish to observe, that in unison with the spirit of disinterested patriotism, which hath distinguished the Bath Society, they may find it eligible to encourage the reception of seeds or seminal plants of the *acer saccharinum* of America; and I

\* So far as this is connected with the political interest of the nation, deeper considerations are involved.

may farther notice, that with a large sample of refined sugar, which I last summer received from thence, I received a paper of its seeds; two plants from which made their appearance in autumn, and I persuade myself more will in the ensuing spring, as these seeds are in formation and genus like our maple seed, and I have no doubt but their habits are like them, and ashen keys, which rarely vegetate until they have laid in the earth at least one winter.

It may not be improper to subjoin an extract from a letter I received, with the above-mentioned sugar and seeds, from a respectable character of Pennsylvania, (viz. Henry Drinker) on the progress their manufactory of sugar had made, dated in a spring month of 1791. “ Last year one person brought  
 “ to market from a neighbourhood not ten miles  
 “ square, about fifty tierces of this (brown maple)  
 “ sugar, weighing from twelve to fifteen tons. In  
 “ all probability the exertions and advances made  
 “ in this truly promising business, will produce ten  
 “ times the quantity ever before made.”

I am, sincerely and respectfully, &c.

*Norwich, Feb.*  
*24th, 1792.*

JOHN WAGSTAFFE.

## ARTICLE XIII.

*On Mangel-Wurzel, and other crops for Feeding Cattle,*

TO THE SECRETARY.

DEAR SIR,

I AM sorry and surprized to read Dr. J. Anderfon's letter in your 5th vol. p. 146, depreciating the root of Scarcity. It is very clear he had not the true sort, as he says he bought it at a common seed shop. I have never yet been able to buy unmixed seed at any shop; always finding a great proportion of red and green beet; therefore I shall always raise my own seed, which requires very little trouble. Dr. Lettsom's description and account of the true sort is very accurate, but it is not worth while for a great farmer to gather the leaves; and it is very doubtful whether the root will increase more by taking away some of the leaves; if they fall and rot on the ground, they will preserve moisture, and be of service there. But the great question is as to the weight and value of the roots, for feeding horses, cattle, sheep, and hogs, or any of them, and whether they have any, and what advantage over the plants and roots before in use. This is a very copious subject, and I have not time to write fully on every part of it.

Doctor



Doctor Anderson, p. 150, says, “ The fibres that  
 “ spring from the roots are so numerous and strong  
 “ as to entangle a great deal of earth among them,  
 “ from which it is difficult to disengage it; in wet  
 “ weather in winter, I do not see how it would be  
 “ possible, &c.”

The root of the beet is entirely under ground, with strong fibres like the turnip-rooted cabbage, but the true Mangel-Wurzel grows mostly above the ground and is very easily drawn; and all those animals will, when hungry, eat at first both root and leaves, but some creatures are at first averse to new food, and will refuse turnips, carrots, &c. which they afterwards become very fond of, so that no one should judge and determine precipitately, as it is known that many sheep will almost starve before they will eat turnips. All writers do not sufficiently distinguish the crops that best suit clay-land, strong loam, and a light sandy gravel; nor do they give distinct accounts of those crops that may be drawn off the land at Michaelmas, in order to sow wheat, and those that will best stand the winter to be eaten off the land, which is the cheapest and most beneficial method, where the soil and situation is dry enough; but even in that case to raise potatoes, mangel-wurzel, carrots, or parsnips, in the summer fallows,  
 and

and house such crops before winter, near the fold yards for cattle, &c., will enable the farmer to keep more stock in winter to tread his straw, and greatly increase that valuable thing on a farm called *dung* or *muck*. Having land of various sorts, I practise a little of each, and find no difficulty in farming advantageously, but to get my workmen to be honest and diligent; as I can seldom spare time to look after them sufficiently, the very best bailiff cannot or will not get as much done as the master can.

I see for the first time a short account of the root-baga, and mowing cabbage, in Sir Tho. Beevor's letter, of which I wish for further information, and to obtain the seed next spring.

Sir Thomas seems to think Mangel-Wurzel of little or no superior value, as it will not stand the frost; which so very large a root, growing mostly above the ground, cannot be expected to do; for roots are generally tender in proportion to their bulk, and the quickness of their growth: and it is so with trees, the slowest growers are most hard and durable. I think that turnip-rooted cabbage stands the winter better than any other root in use, but it grows slowly, and never produces so large a crop as the other roots I have mentioned; and there

is

is much trouble and difficulty in separating the earth (if clammy and stiff) from the roots. On the whole I know no crop so certain, and so productive and useful, as potatoes; they will feed most, if not all kinds of stock.

Those farmers who have most leisure, should ascertain for their own government, in their respective soils and situation, the comparative degree of nourishment in a given weight of each root now in use, to feed every kind of farmer's stock; perhaps the least perishable, are at once the most solid and the most nourishing. Those that abound with saccharine juices are certainly so; and such are carrots and parsnips, which are difficult and uncertain to raise and keep free from weeds, and are only fit for a deep light soil.

I write in a hurry these general ideas, as they occur to me; if they are of any use I shall be glad.

And am, Sir,

Your obliged humble servant,

*Lamnibangle,*  
*July 19th, 1790.*

J. FRANKLEN.

## ARTICLE XIV.

## On WOOL, SHEEP, &amp;c.

TO THE SECRETARY.

SIR,

THE premium offered by the Bath Agricultural Society, for ascertaining in the Western Counties, by any experimental method, the best breed of Sheep in *Carcase* and *Wool*, seems perfectly judicious. Both these being equally essential to us: the one as adding to the supply of food; the other, to the means of industry obtaining it. The great mistake of either, separately attended to, I conjecture to be, the rearing on an enormous carcase a very coarse, though long wool; which can only be applied to those inferior manufactures, in which the ingenuity is so trivial, that the raw material makes nearly half the value of the fabrick; or the rearing on a small carcase, of moderate meat, a small quantity of that fine wool, so essential to the more delicate and artful manufactures. Wool of this sort, at the rate of one to two pounds per sheep, is collected here from the most ragged rambles of our commons; and worth, when culled, half-a-crown a pound. The extent, shortness, and sweetness of their feed, throwing the value into the small fleece. But to encourage, or even permit, as in spite of  
our

our boasted improvements is still done, a collection of commonage, for affording a scanty pittance of short feed, on a wide ramble, in order to gather in return a few fleeces, comparatively, of even the finest wool, would be supporting the boast of manufacture at the expence of food and population. At such expence is the pride of Spain in her flocks now supported,—a policy far from enviable! That the finest broad-cloth has gradually decreased in goodness, and the narrow-cloth equally improved, is very palpable; and has probably arisen from an increase by cultivation of that sort of pasturage, which maintains a far greater number of the best sheep, with some diminution in their fleece of finer wool;—too great a mixture of Spanish with English wool in the fabrick, in order to remedy this decline of our own, only procuring the usual fineness at the expence of the old texture.

Since the improved culture of Norfolk and Suffolk, by converting extensive sheep-walks into fine inclosures of wheat, barley, clover, and turnips, with rye and tares; the wool of their provincial species has decreased in fineness; but been amply compensated by the larger quantity raised on more numerous flocks, supporting and supported by the most improved agriculture; and at the same time  
supplying

supplying the market with some of the best winter mutton. The Suffex South-Down breed, lately introduced into these counties, will feel the same effect of change, from short, natural, and extensive, to confined, succulent and artificial pasturage; and however profitable on the whole to the grazier, and beneficial to the community, as from the greater numbers supported on a given quantity of pasturage every late trial at present confirms; yet from the very beneficial mode of their support, will gradually decline in the delicacy of their fleece, unless amply and annually supplied with additions to the flock from the original stock on the Downs. The wool of them in this neighbourhood has been sold hitherto at 2d. and 3d. per pound lower than the same in Suffex; and the wool of the second year of importation from Suffex, of the same sheep, was not equal to that of the first.

I have been informed, by a very eminent manufacturer, that many years since an attempt, from a supposed similitude of pasture, was made to introduce the long-wooled Lincolnshire breed into the hundreds of Essex. The staple was perfect at the first year, declined in the second, and was lost at the fifth. Repeated new supplies and crossings might have kept up somewhat of the species, and settled at

last a near approach to it. This is now trying here between the Norfolk and the South-Downs; and promises a breed that may unite very tolerable wool with a very fine carcase; equally proper for the fold and artificial pasturage; of a bulk superior to the South-Downs, inferior to the Norfolk, but smaller in the bone, rounder in the form, tamer in disposition, and thriving with equal profit on less food.

From the drawing and description of the *Moufflon*, a wild sheep of Tartary, and supposed by some naturalists to be the primitive race; the Norfolk, of all our species, seems most like this original. A lean long head, large curved horns, a rising backbone; when standing, the fore-legs straight, the hinder bent inwards, strong in his whole make, agile in his movements, and in look wild and bold. Neither this, nor any other provincial sort, have been attempted to be reared to an higher degree of perfection, by perseverance in culling, preserving, and occasionally crossing the more peculiarly perfect ones of the breed, till the Leicestershire Society astonished the kingdom, and I may say, all Europe, with their skill in the trial, their success in the event, and the incredible return to their perseverance and sagacity, from the price paid by those who most laudably

laudably aimed at sharing in the pride and benefit of such improvement. If any little artifice of trade hath been exerted in this extraordinary speculation, the publick has probably shared fully in its result, by the ardour raised, and excited to follow up such an example, by equal attempts; which, if in other counties, more suitable for soil and situation for that purpose, can produce a finer staple of wool on a carcase tolerably equivalent, will probably be still more beneficial, in not only supplying the market with fine meat, but the manufactory with as fine wool.

That the extremest fineness in wool may, in some climates be united with the longest staple, I have proof in a very small quantity that I took from one of a few rough fleeces, brought as a little adventure by the Captain of an East-India ship from the Manillas; it is white as snow, and soft as silk; was bought by the very ingenious manufacturer at eight shillings the pound, and so readily acknowledged by him to have a far superior value in the purposes to which, from its delicacy, it could extensively be applied; (the advanced price of the raw material being comparatively as nothing to the value of the improved manufacture ingenuity can make of it;) that an order was given to collect



in the East-Indies, at a more advanced price, any quantity that could be procured of the same. Yet such was the influence of the *l'Esprit du Corps*, (of which all professions have their full share) that even this instance did not convince the propriety of allowing, by an open sale, the best price as the necessary encouragement for raising at home the best wool the soil and climate would allow, and of thus preventing the manufacturers of our coarsest and inartificial fabricks from assuming, to the restraint of every fine one, too large a portion of our wool; by the encouragement thus given to the grower, to consider the quantity as more valuable than the quality of his fleece. A most glaring absurdity! which, as far as legislative approbation of it can go, must continue, till that period, when a reform in our mode of election and representation shall have, agreeably to the spirit of the constitution, restored to the landed interest an influence and energy equivalent to that of the manufacturers.

It is prouder to deserve, than to receive publick encouragement; and from a taste extremely promoted, in my opinion, among Country Gentlemen, by the writings of Arthur Young, esq; of amusing themselves in agricultural pursuits, it seems as if the improvement of sheep and wool would rise  
under

under its oppression,, and be shewn to have deserved a fairer treatment. 'Grazing ought ever to be the leading object in the farming of mere Gentlemen; and to them, that of sheep will be the most amusing, and the least hazardous. The veriest farmer, to a full flock must have, and extremely confide in, for every profit, a regular shepherd; the Gentleman needs do no more; and with a little additional allowance will, in this traffick, and this alone, stand on as safe footing for his amusement, as his tenant does for his support, against waste, idleness, and imposition. For the arable necessary for the supply of artificial feed during winter and spring, need be only in such very moderate quantity, as to require little labour and expence; the most extensive lawn is thus turfed by the close bite, and thickened by the manure of the flock; the finest wool, for that should certainly be a principal object, is gradually obtained; and the breed, found by experience most suitable to it, maintained on a soil kept by that very means in a constant state of improvement. Exclusive of the private advantage of thus cultivating a demesne in the most profitable mode, and the rational entertainment resulting from experiment on an animal whose varieties are so great, as to receive from change of climate and food a perceptible distinction of form and qualities;

the general benefit of every county is immediately consulted by the only means in which the common farmers can gain the chance at an easy charge, and speedy rate, to have the best breeds gradually conveyed within their reach; and the kingdom thus stocked with what is most profitable under its present circumstances.

To a considerable increase of population, we must certainly attribute the alarming report of a late committee, that this kingdom does not at present grow more corn than is necessary for its own consumption. It is therefore in policy a criminal disgrace to permit the wastes to remain unclosed, even where they are a tolerable sheep-walk; when by an apportionment of waste to individuals, under the present rotation of crops on arable land, flocks, upon the whole of superior value, might be kept up in not inferior numbers; and with due encouragement, not less delicate in the wool. At the same time, they would contribute by the fold to raise corn for the support of that multitude to which the manufacturing of their fleece affords employment, and in consequence has added to the increase.

From the North of Scotland, where the climate renders grazing the only proper agriculture, we  
may

may expect, under the attention, industry, and expence of its patriot adventurers, the best breed for the finest fleece, and consequently, I presume, of less valuable carcase. But in England, to reach perfection in the latter, and approach to it in the former, is agreeable to our *clay* and soil; necessary to our culture and population; and every encouragement and reward that rouses competition for their mutual attainment, excited by publick virtue, and regulated by good sense.

I am, respectfully, your's, &c.

CHARLES ONLEY.

1792.

#### ARTICLE XV.

*On Planting, Grafting, and making Cyder.*

THE SECRETARY.

SIR,

**A** Premium being offered by the Bath and West of England Society for the best practical Essay, founded on experience, on raising Apple-Stocks, and the most successful method of grafting  
and

and raising apple-trees for the orchard; together with the best essay on gathering apples, making them into cyder, and of managing that cyder until it shall become fit for use; induces me to transmit through your hands the method I have successfully practised. If it should be considered worthy the attention of the Society, I shall esteem it the highest honour.

I am, Sir, your obedient servant,

J. N. MORSE.

*Newent, Dec. 5, 1791.*

After the apples are ground in a mill, and the juice for cyder (or if crabs, the verjuice) is pressed from the rind, stalks, core and kernels; this is called the *must*, and should be crumbled quite small, and laid thin on a board floor to dry; for if it be laid thick, it will heat and destroy the vegetation of the kernels. To prevent its heating it should often be turned with a malt-shovel.

Prepare a piece of ground by well digging and clearing from weeds, keeping the surface smooth; and in February or March lay the must thereon, and shovel-turn it in, that it may be two inches deep;  
in

in about six weeks the young plants will appear, and be kept clean from weeds; let them remain two or three years in the seed-beds, when they are to be taken up, and the tap-root cut off, as also some of the spreading branches. There now select out another piece of ground prepared by double digging, wherein to transplant the stocks, laid out in beds four feet wide; plant them in rows across the beds about one foot distance between the rows, and eight or ten inches distance in the rows; let them stand here three years, when they must again be taken up, the roots and tops dressed, and planted in rows about eighteen inches distance in the rows, and three feet between the rows; but four feet is better, as it will be more room to dig the ground between them, which should be done at least once a year, and kept clean from weeds, &c. by hoeing. Transplanting them twice, and pruning their roots, makes them root better and stronger, and commonly rise with a wig or fibery root.

They are to stand in this nursery until of sufficient size to plant in orchards; some may be large enough when ten years old, others not until fourteen or fifteen; for they may be of very different sizes, although sown and planted at the same time. Here they are to be carefully trained up straight, and  
pruned

pruned every year, by cutting off five or six of the largest knots or sprays each year, and not many more in one year, as it would make the stock grow top-heavy and throw out more branches. This pruning should be done in the spring season, as the wounds will heal soonest when the sap is rising; but if pruned in autumn or winter, the wounds will be long in healing, and be very black, and continue so for years.

Stocks ought to be strong for planting orchards that they may the sooner grow out of the way of cattle, which very often does them great injury. The size I choose to plant is from one inch and a quarter to one inch and a half in diameter at the grafting place; that is, about five feet six inches from the ground.

The method I pursue in planting orchards is, first lay out the field by setting up stakes equidistant; 20 or 22 yards from each other, I look upon as the best distance. After they are properly arranged, dig a hole considerably larger than will take the roots of the stock, that the earth may be soft and mellow for them to strike therein more freely; have your stock ready with the roots and head pruned, particularly those that were bruised in raising; place  
it

it upright in the hole. If some better mould, such as street-shovelings, or a compost made with rotten dung, good mould and lime, (lime kills the ants, which are very destructive to stocks and trees,) were mixed with the soil to fill the hole, it will expedite the growth of the stock. Care should be taken to fill up every vacancy between the roots, shaking the stock well whilst filling; when filled, tread the earth down to the roots pretty hard, then have a stake four or five feet long driven sideways in the ground leaning against the stock, pointing to the west wind, and firmly tie the stock to the stake with an ozier twig, placing a hayband between the stock and the stake, to prevent galling; this will prevent the wind shaking the stock, which very often injures it, and prevents its taking root. We should then have six or eight black-thorns, pointed and stuck in the ground round the stock, reaching up to the head; these should be tied in two places with twigs, to prevent cattle or sheep from broufing on, or rubbing, or peeling the stocks, which they are very apt to do, particularly young sheep. I have had stocks peeled quite round by sheep. The grease of the wool, when sheep rubs against them, injures and retards their growth. Where wood is plenty, if three posts be erected triangularly round the stock, and laths nailed to the posts,



posts, it is the best fence. The stocks must now stand three years to take full root; at the expiration those that have made free shoots should be grafted with what sort of apples the planter may please.

The method of grafting these large stocks is that in the cleft, and performed as follows: first, with a saw cut off the head of the stock in a smooth place, at five feet or five feet six inches from the ground, pare it very smooth; then with a strong knife and mallet cleave the stock about one and half inch down, a little on one side the heart of the stock; draw out the knife and put a wedge, driving it easy in the slit at the top to keep it a little open. Then with a knife made for that purpose, only open the slit about one and half inch long, half an inch wide on the rind, bringing it to a feather-edge near the heart, and to a point at the bottom of the slit. You must now have your grafts or scions ready, which must be cut with a keen knife very smooth to fit, and place it in the cleft, so that the rind of the graft may exactly meet the rind of the stock. If the stock be large enough you may put another graft on the other side; when rightly placed, draw out the wedge at top, taking care not to displace the grafts, and the stock will close in and hold fast the grafts, when you must have some smooth clay mixed with

with fine hay, made into pledgets, and wind round the grafts and stock, making it smooth on the outside; this will keep the wet and air out of the crown of the stock, and the sun from exhausting the sap. The best time for performing this business is in February and March. Whip-grafting is practised with great success, and generally on small stocks about half an inch in diameter. The graft or scion nearly the size of the stock. This stock must be cut off in a sloping direction, and the graft also, about one and half inch in length; pare both stock and graft smooth, and to fit each other, particularly betwixt the wood and rind, that the sap may freely circulate; then cut a slit or tongue about half an inch in the scion upward, the same in the stock downward, to receive the tongue in the scion; in that manner fix the graft in the stock; immediately tie a string of soft bafs or yarn round to keep the stock and graft in its right position, and immediately cover the place with some grafting clay. In May or June the bandages must be taken off.

Saddle-grafting is somewhat similar; the stock being cut off sloping, and the scion made to fit, and tied on as in whip-grafting.

Apples should be gathered when full ripe, and will quit the tree by gentle shaking; if gathered before ripe the cyder will be rough and hard, and feldom pleasant or good flavoured. Lay them on the ground in a fruit-yard, better if upon a gravel walk, as the wet will run from them and they will lie dry in the bottom; should not lie thicker than ten or twelve inches, and are better kept without than within doors. Care should be taken to place fruits of equal ripeness and good qualities by themselves; for if of different ripeness the cyder will be apt to ferment too much, which will cause it to grow hard, and never be rich, full and fine-flavoured.

When the fruit is thoroughly mellow, it must be committed to the mill for the purpose of cyder-making, made with a stone chafe and roller, something similar to a bark or a sugar-mill. The roller drawn round the chafe by a horse. Here it should be ground to a pulp, that no bit of apple may be seen, and until you cannot hold it in your hand, if you take a handful and squeeze it; the kernels and rind will then be well broken, and will give the liquor a fine flavour. Let it be put into tubs or hogsheds with one head out, and remain there two days, then press it through hair-cloths. I use fourteen or fifteen, putting about two pails full in each,  
turning

turning up the sides and corners; then put another on until the whole are filled, when press it with a screw; put the juice into hogheads; after it has been there a few days it will work and throw up a thick substance at the bung-hole, somewhat like barm, but of a darker colour; when this appears it generally is dropt fine, and should be immediately rack'd into a clean cask; for if the substance be suffered to fall, the grounds from the bottom will rise, and the whole will be in a ferment and very foul, and perhaps must be rack'd three or four times before it can again be separated and got fine; and will run a risque of making the cyder harsh. So long as it remains fine and free from fermenting, it may remain in the cask, but if it ferments much it should be rack'd, and the grounds or lees\* taken from it; it often requires four or five rackings. Cyder made with different sorts of apples keeps best by breaking and mixing together; but this should not be done until it is fine, when the proprietor may blend it to his palate. After the whole is done, a bung may be placed over the bung-hole, but should

\* N. B. The lees may be dropt through a bag or bags of coarse cloth, made in the form of a jelly-bag, with a hoop sown round the top to hold about a pail full; by doing this very little cyder will be wasted, and the droppings added to the cyder will be a means to keep it from fermenting, and will also help the colour.

not be close stopt until February or March, when it it will be fit for sale or use.

If cyder do not fine, some people use isinglass. For one hoghead of a hundred gallons beat about one ounce and a half and pull it to pieces; add to it about two quarts of liquor, and whisk it together; next day add more liquor, and whisk it: repeat this until it be dissolved, and beaten fine. Rack your foul liquor, throw in the dissolved glass, and stir it together with a stick. As soon as it drops fine, rack it off into a clean cask.

Cyder should not be bottled until sixteen or eighteen months after it is made, as it would endanger the breaking the bottles.

J. N. MORSE.

## ARTICLE XVI.

*On a particular Kind of APPLE, &c.*

TO THE SECRETARY.

SIR,

ARTICLE xxth of the 4th volume of your Society's Papers is surely interesting to the planters of orchards. Your judicious comment in a note, and humane invitations to the publick to furnish

nish scions of such different fruit as may contribute to the general good, by improving the stock of so valuable an article, merits praise.—If the following character of the fruit of a certain apple-tree be thought worthy of your Society's attention, a few scions are at their service.

Having purchased a small freehold in the year 1777, the last proprietor informed me there was a certain tree in the orchard (which orchard in general was in a deplorable state) of so excellent a kind, that they could always sell the fruit at an advanced price; nay, was so good as to require no sugar when made into a pye. Being a little hard of belief towards this last assertion, trial at least ought to be made, which was done by adding the usual spices, reserving only the sugar. The consequence was, the pastry was so well relished, that this apple to this day maintains its superiority at table, without the addition of a grain of sugar.\* I requested an eminent nurseryman in this neighbourhood to examine the tree and the fruit, and inform me, if he could, what kind it was. Of the tree he could form no guess; having tasted the fruit, he called it the Orange Pippin, the shape being similar to an old

\* *Quere*, If a fair trial were made, would not many kinds of our best table-fruit do the same?

fruit of that name, and its colour when ripe something resembling an orange. He begged a few scions, (the kind it should seem was not general) and has dispersed since, over the country, great numbers. The shape of the tree is the best possible for an apple, its branches extending horizontally, and when loaden with fruit, bending downwards. It is a constant and generally productive bearer; I think never quite barren. As to the flavour of its fruit, the nearest I can compare it to, is that of the Ribstone Pippin, but not quite so high (i. e. inferior probably.) After Christmas it loses some of its excellencies, but will keep sound till the season of gooseberries.

It is no bad œconomy, when any particular plant is found congenial to, or to flourish in a certain soil, to cultivate that plant. As this tree agreed so well with my ground, and the fruit had so many recommendations of its own, I determined that this apple (retaining a few varieties) should be chiefly cultivated here. The young plants are but lately become bearers. I am sorry to observe, that although the fruit is good, it is yet inferior to the parent stock: here then appears a degeneracy. I have not yet learned how it has answered in other places. Such as it is, a few scions are at the Society's service, by  
 sending

sending directions how and whither they may be sent, in a line directed to, Sir,

Your obedient servant,

JOHN HOLT.

*Walton near Liverpool, Jan. 3, 1790.*

☞ This gentleman's offer was thankfully accepted, and the scions disposed of to gentlemen most likely to propagate them. We take this opportunity of repeating, that if any gentlemen who may think themselves possessed of superior fruits, will be so obliging as to offer scions to the publick, through the medium of the Secretary of this Society, it will be deemed an essential service.

## ARTICLE XVII.

### *On Transplanting WHEAT, &c.*

TO THE SECRETARY.

SIR,

I Beg leave to offer a few thoughts upon dividing and transplanting Wheat, on which subject a premium has been offered, upon two varied experiments, and which originated, it may be presumed, from the amazing quantity raised from a single grain of corn, repeatedly divided and transplanted.



planted, as recorded in your transactions; I cannot refer to the particular volume, not being in possession of the work.\*

It is a fact well known, that to establish some favourite hypothesis, or in pursuit of some favourite scheme, perseverance in the prosecution has been almost incredible, to ensure a successful issue : hence different effects from different motives. In other words, when reduced to common practice in the rude hands of the labourer, who has no other motive to action than to obtain the hire of his industry, the effects are not always favourable. The wisdom of providence has ordained, that the most useful knowledge is with least difficulty obtained; and the most useful practices most easily executed.

The act of dividing a root of corn, which consists of several branches, requires no small degree of delicacy in the operation, to preserve some part of the original root to each separately divided stem. To this difficulty may be added, the chance of obtaining a proper and seasonable opportunity; without moisture either from showers or watering, the plants must inevitably perish under the operation: under the most favourable circumstances, the plants re-

\* Vol. iii. page 388.

quire some portion of time to acquire their former health and vigour, consequently this check, according to the number of repetitions, will proportionably retard the maturity of the grain. Nor is this reasoning from theory, but actual experience; and that the cultivator of this extraordinary produce was well aware of these facts, is evident: for the grain of wheat was committed to the earth, if I recollect truly, in June, four months previous to the natural season of sowing this species of grain; so that it had this length of time, or nearly two seasons, or one summer in advance, as it were, to aid these several checks or drawbacks on vegetation.

From the foregoing premises it should seem, that although the fact may be practicable by the diligently curious, it can never become useful to the practical cultivator. Far from depreciating these ingenious trials of persevering industry and skill; they may be productive of utility, and ought to be recorded. Hints generate hints; and the experiment under consideration has produced the following, of separating the different branches from a single potatoe, and replanting each stem thus divided, and taken from the original set. Whether this practice will be productive of any good, remains to be ascertained, as this experiment is only

in process; but this I already observe, that the stems separate without difficulty, (no less than fourteen from *one* root) and vegetate again with vigour; more so than any species of grain I have hitherto divided or transplanted. It cannot be doubted that a moist season was adopted.

I cannot forbear mentioning one method of transplanting wheat, which may be worthy the attention of the industrious labourer, to whom a few hours extra work may not be an object equal to the saving of purchasing seed, or saving the grain for the use of his family: it was this species of œconomy that pointed out that useful method of dibbling wheat, first practised in Norfolk: I mean collecting seedling plants from the wheat-stubbles which have been self-sown the preceding autumn. These plants are not of the least utility to the farmer, but are sometimes, by hurricanes or other accidents, so abundant on the ground as to afford sufficient stock to plant many acres. It may happen the autumnal season is not favourable to the seed harvest, the land may be wet, &c. In such cases these seedling plants, which would otherwise be lost, may be rendered extremely useful. Under these circumstances, I planted a piece of potatoe ground in March last with seedling plants, collected from a wheat-

wheat-stubble, which at this present juncture have a most promising aspect.

I wish you health to see the Lancashire apple flourish in your neighbourhood.

And am, SIR,

With much esteem,

Your obedient servant,

J. HOLT.

*Walton, near Liverpool,*

*May 31, 1790.*

# ARTICLE VIII.

*On the Loss of Weight in Grain, &c.*

TO THE SECRETARY.

DEAR SIR,

FROM a variety of experiments made upon evaporation, I have selected and sent the following, as falling more properly under the plan of your Society. The facts may afford some useful hints to the farmer, and serve to instruct him, that  
besides

besides the rats, mice, and other vermin, he has a secret and silent, but never-ceasing enemy, continually making depredations upon his property, as the following experiments, to ascertain the loss that grain, especially wheat, sustains, will verify.

## EXPERIMENT I.

AUGUST 31<sup>st</sup>, 1789.

Gathered and rubbed a few ears of wheat during a glowing sun, which being immediately put into the scales weighed 2 ounces 11 drams. October the 18<sup>th</sup>, being put into the scales again, then weighed 2 ounces 7 drams. The loss of weight per bushel of 70 pounds (the customary measure of this neighbourhood) is 6 pounds, 8 ounces, and 3 drams, nearly, or almost one-tenth of the whole in 49 days. But this is the greatest loss that grain can possibly sustain, which, although perfectly ripe, had neither the advantage of being dried in the sun after being reaped, nor had it undergone the process of fermentation after being got together.—N. B. Thirty-two grains weighed one penny-weight.

## BARLEY.

Exp. II. *Sept. 2.* Under the same circumstances put into the scales 2 ounces and 2 drams of barley; which

which, being tried again Oct. the 18th, weighed 1 ounce and 12 drams, or, at 60 pounds to the bushel, had lost 8 pounds, 4 ounces, and 22 drams, or about one seventh of the whole in forty-seven days.

N. B. Twenty-four grains of this barley weighed one pennyweight two grains, so that this corn must have been softer, or in a less matured state, than the grains of wheat in the first experiment. Since 24 grains of plump wheat are reckoned to weigh one pennyweight, and hence the standard of that weight; whereas we see the pennyweight took 32 grains.

#### WHEAT.

EXP. III. *Oct. 22d.* Put into the scales six ounces three drams, which in 24 days lost three drams, or after the rate of two pounds one ounce, fifteen drams, per bushel.

#### WHEAT.

EXP. IV. *Jan. 8th, 1790.* Took two ounces two drams of wheat, which in thirty-two days lost after the rate of 2 pounds 15 drams per bushel.

From these experiments it appears that the decrease in weight was pretty regular from the time of harvest, and the time taken in ascertaining the loss  
of

of each quantity: in other words, that the sum of the matter evaporated becomes gradually less according to the length of time kept on hand, but proves that the sooner the crop is brought to market, *ceteris paribus*, the greater is the advantage to the farmer.

N.B. The number of grains to a pennyweight in the two last experiments was omitted, or forgotten to be registered. After the loss sustained in the experiment No. 4 had been ascertained, the grain was exposed a few minutes before the fire, and when weighed again had lost three pennyweights.

If such be the loss in weight of grain, we may conclude the potatoe, which evidently contains a considerable quantity of water, must also suffer by evaporation, although its quality may by this loss be improved.

*Aug. 27th, 1789.* Took a pint-eye potatoe, fresh from the earth and well cleaned, which weighed two ounces, nine dwts. and twenty grains; the day following it had lost twenty grains; two days after twenty-six grains; in four days more thirty-one grains; in ten days more, or at the end of seventeen days, it had lost forty grains. But we observe it lost as much the first day, as the last sixteen; in three days,  
six

six grains; whereas in thirteen days more, it only lost fourteen grains.

If such be the progress of nature, we may naturally conclude this effect is increased by the culinary process. A potatoe that weighed 2 ounces, 7 dwts. and 5 grains, in its natural state, after being roasted only weighed 1 ounce, 5 dwts. another before being put into water weighed 2 ounces, 5 dwts. and 6 grains, but immediately after being boiled, had lost 54 grains.

Left you should fear I am entering upon a system of cookery, I abruptly conclude.

Sir,

Your obedient servant,

JOHN HOLT.

*Walton, near Liverpool,*

*Nov. 1st, 1790.*





# ARTICLE XIX.

*Observations on the Subjects proposed by the Bath Society, in their Circular Letter of July 30th, 1791, for Enquiry of the several Persons to whom the said Letter was addressed.*

## *Extract from CIRCULAR LETTER.*

“ The Society has been informed, that great damages  
 “ have been done to many Fir Plantations (particu-  
 “ larly among the Scotch firs) by squirrels preying  
 “ upon the bark.”

“ Generally done in the spring, when the winter hoards  
 “ of these little animals are exhausted.”

“ The injury has been generally done, by gnawing the  
 “ bark quite round the leader of the tree, a few feet  
 “ below the top, the squirrels chewing it for the sake  
 “ of the moisture, and dropping the woody part like  
 “ saw-dust on the ground.”

“ The tree thus barked decays in that part, loses its top  
 “ by the first rough wind, and of course gradually  
 “ perishes.—The society wish to know, how far  
 “ such complaint is general.”

## OBSERVATIONS.

**M**ANY hundred Scotch firs were damaged by the squirrels, in Lord Bath's plantations, in the spring of 1788. Some few have been damaged since,

since, but not in any degree equal to the extent as at that time.

These trees (which were then about 16 years old) were gnawed round the stem, about 10 or 12 feet from the ground, in the manner described in the Society's letter.

The trees lingered through that and part of the next year; but the bark immediately below the wound, swelling and forming a callous, the greatest part of the trees were broken off by the winds in the autumn and winter of 1789.

I made the following observations, on the kind of trees the squirrels chiefly preyed on, and the nature of the plantations in which those trees grew.

They attacked only Scotch firs, though spruce, silver, and larch, were in the same plantation. They chiefly fell upon the most luxuriant and fastest growing trees, whose bark was thinnest, and of course most full of turpentine. They spared the rugged barked trees, or where they began upon such trees, they left them without barking them round. The time was in March and April; and the plantation was near a large native forest, where  
the

the squirrels abounded, and from which they were probably allured by the number of fir cones, of which it is well known they are very fond, and when they had finished the cones, they began upon the bark.

Luckily the plantation where the mischief was done, had its due proportion of beeches and other forest trees, so that the loss was not long felt, as the Scotch firs, which were only planted for nurseries to the forest trees, would have been taken away in a few years, if this accident had not happened.

The remedy is obvious and not difficult, viz. to shoot the squirrels, as they are easily seen and heard when about this work; but they must be watched closely the moment they begin, as it is astonishing what a number of trees a few of them will spoil in two or three days.

There is this source of comfort to planters, viz. that in large plantations, where forest trees, such as beech, oak, &c. will grow, such trees should by all means be planted, and sufficiently thick to form a wood, when their nurseries the Scotch firs are removed. For although Scotch firs are more profitable, and the timber really more useful, than is generally understood, yet as the period of their growth, or at least  
of

of their beauty, is much shorter than that of deciduous trees, provision should be made for the permanency of the plantation as well as for its present beauty; and in plantations where scarce any thing but Scotch firs will grow, and such soils there are, the squirrels, if any should find their way thither, cannot live through one winter for want of food, and of course may easily be kept under; besides (as was before observed) the bark of the firs growing on such soils, will be so hard and rugged, that the squirrels will be able to do very little mischief.

The society will, I hope, excuse my giving my opinion (the result of my own experience and observations) on modern plantations in general.

The fault is not so much in the kind of trees usually planted, for all trees are fit for something or other, and the worst may be applied to save the use in many cases of those that are better; and in general *that* is the most proper kind of tree to plant, which agrees best with the soil and situation; but the great fault has been owing to the mode of making the plantations, and in the management of them afterwards. We do not sufficiently follow nature as our guide. We do not first consider what kind of a wood we wish to have, and then take the methods which

nature

nature points out to get such a wood. If we wish to have a grove of large spreading trees, where the soil and sheltered situation warrant the probability of the success of such an attempt, we must not plant our trees so thick as to deprive them of all their under branches, on which the beauty of every tree, taken individually, depends, and thereby make a wood of poles instead of trees.

If we plant to cover a bleak, exposed, barren spot of ground, where, if we do not plant the trees thick, it is useless to plant at all, and where of course the under branches of the trees cannot be preserved; we must not make our plantations, as is too frequently done, of so small a size, that, instead of being (as they are intended to be) a shelter to the adjacent country, the trees will not even shelter each other from the winds, but become mossy and stunted, and catch colds which they never recover. And when the owner has flattered himself for 30 or 40 years, that he shall live to see the fruits of his labour come to perfection, he finds he has it all to do over again.

The great damage generally done to plantations, next to that of suffering them to be eaten up by cattle, which is not uncommon, is by the cold winds (in this county the south-western)  
which

which affects them most seriously, when they begin to throw off their lower branches, and leave their bodies naked. To this period we ought to look forward in all our plantations. Till that time, trees may be made to grow and thrive in almost any situation; but shelter is perhaps of more consequence than soil to the growth of trees. If that cannot be obtained from the natural situation, we must make the plantations a shelter to themselves. In the first place we must make them big enough, that the wind may not blow through them *when grown up*; and secondly we must thin them early and often, and inure them gradually to bear that degree of cold, which it will be necessary for them to bear, when nature has deprived them of their under branches, and left their bodies naked. Plantations so made and managed, will prove beneficial to the owner, ornamental to the country, and useful to the community.

*Observations on the supposed Neglect and Scarcity of  
Oak Timber.*

*Extract from the Society's Letter.*

- “ AS from the supposed neglect and scarcity of Oak  
 “ Timber, planting and the preservation of woods is  
 “ become an object of great national consequence.  
 “ The society wish to know your sentiments on the  
 VOL. VI. N “ present

“ present state of oak plantations in general, and how  
 “ far you think the *larch*, or any other tree capable  
 “ of being substituted for *oak* in any branch of ship  
 “ building, has been attentively cultivated.”

*The following observations resulting from an experience of near 30 years, and that a very extensive one, not only in planting, but in cutting down and converting every kind of timber, as well for the navy as for home uses, are respectfully offered to the Society.*

## OBSERVATIONS.

**T**IMBER is an article of commerce. The scarcity of any article of commerce is usually owing to the increased demand, or the lessened production of that article. The increased demand is usually followed by an increased attention to the production. The *scarcity* of any article, in itself indispensable, and *the neglect* in the production of that article, is therefore a paradox in commerce. To prove that the scarcity of oak timber is a chimæra, and to convince every *Briton* that the navy, *the pride and bulwark of his isle*, will never want *English oak* to enable it to keep up that superiority it has always held among maritime powers, will not be I trust a difficult task. I am sure it will not be unacceptable to the society, the great object of whose institution is, “ *that this generation shall not leave the world worse than they found it.*”

To

To confine our observations at present to oak timber for ship-building; if such timber were really scarce, the price would rise. The contrary is the fact. In the merchants yards, futtocks and large knees are sunk considerably in value since the conclusion of the war; and yet these are the pieces the most in request, and the most difficult to procure. Government have not actually altered the Dock-yard prices, for more than 20 years past; but they have virtually *sunk them of late*, by increasing the metings of the timber which they take in. That is, they now reject timber under a certain size, which till of late they were obliged to take to induce the dealers to bring them the large pieces they wanted. They now take the large pieces at the old price, and reject the small. The price of ship-timber is therefore really less than at the conclusion of the last war; and as we have now a prospect of a long continuance of peace, there is every probability of its being still lower, or at least not advancing, especially as it is well known that our navy is in such a state, that, even admitting we were again involved in a war, it would want only common repairs for some years to come.

There is now in the county of Hants alone, timber enough to supply nearly the common consump-



*tion of Portsmouth yard, and in the other maritime counties nearly sufficient for all the rest of the yard. But a great deal of oak in distant parts of the kingdom, will now find its way to the sea-ports, by means of the many canals in the kingdom, which formerly were consumed only in the domestick uses of the county where it grew, while those same canals will bring back deal at a cheaper price to supply those domestick uses.*

The uses of oak lessen every day. Houses were formerly built almost entirely with oak timber; but now the innumerable new houses in Bath, Bristol, London, Manchester, Birmingham, &c. have very little oak in them. Deal answers the purpose at a much cheaper rate.\* The great fear would be, provided that oak was only wanted for ship-building, that the price of it would sink so low as to make it hardly worth growing. Even now it would be difficult to find almost any kind of timber, that does not pay better for planting than oak; but

\* In consequence of the numerous buildings alluded to, or from an increased foreign demand, or scarcity in the Northern countries, or perhaps from a combination of all those causes, fir timber is now so much advanced, that the cultivation of oak, with a view to building uses, seems to present itself again as an object. And it is probable that the best species of fir, which grow faster, will not be raised in vain for the common uses of home consumption,

luckily there are thousands of acres in this kingdom, where *oak* is *the weed of the country*, and grows without planting; and luckily there are two or three purposes, for which oak timber is wanted besides ship-building, which will make it worth the owners while to encourage the growth of it in soils of that description, and will keep up its price in peace as well as in war.

*First*; The continual and increasing demand for bark for tanning, which is now so great, that the bark is worth in inland situations, nearly one-third of the value of the timber; and, if the timber is small and near the sea-coast, nearly one-half.

*Secondly*; The amazing and increasing demand for beer casks, of which the consumption is increased to an astonishing degree, And

*Thirdly*; The demand for laths and spokes for wheels, with which the market is never overstocked.

These uses of oak timber, viz. for barrels, spokes, and laths, requiring only the straightest timber, will leave the crooked pieces, *the great desiderata of ship-building*, purposely for that use; and as by means of

the canals, those pieces can be got to the sea-ports as cheap from the inland counties as by land-carriage from the maritime counties, there will be no danger of want of oak timber, either in the King's or the merchants' yards; or that the price of it will rise higher than its real value, compared with the value of other timber.

But admitting the scarcity of oak *ever* to be real, I beg leave to state to the society my reasons for thinking that larch will never be a substitute for oak in ship-building.

The strength of a ship depends on the tightness and solidity of its construction. The strait pieces of timber used in a ship are very few, the greatest part are crooked. And to attain the necessary tightness and solidity of the whole, those crooked pieces must grow in the very shape they are to form in the ship. No English timber admits of that variety of shape but oak; and if there were any that did, there is no other that will stand wet and dry.

Larch is a *strait-grained* tree, and cannot be brought into any of the *crooked* uses of a ship, nor will it stand wet and dry for planking. It may supply the place of deal for flooring; but the price of foreign deal at the sea-ports will probably be always  
lower

lower than the price at which larch will be worth for country uses, where it grows.

The larch is a beautiful tree, and doubtless a very useful tree; but I much question whether more has not been said of it than it deserves, at the same time that the poor Scotch firs, with all their faults, have been depreciated much below *their* deserts; though they will grow on land whercon larch will not grow.

The larch will certainly answer all the purposes of fir for timber, but it is not so strong nor so heavy as Scotch fir. I have cut a solid foot of each out of two trees of equal sizes and equal ages; the larch weighed only 51, and the fir 60lb.; and if our Scotch firs grew as thick together, as they do abroad, as we may see by the users which are used for scaffolding, it would be a much stronger grained timber than our's generally is;—only the quickness of the growth and the bigness of the knots make it otherwise. The English grown spruce and silver fir timber are fully equal to any white deal we get from abroad. The Marquis of Bath has used English grown fir, for almost all domestick purposes, in the dry, for 20 years past, and finds no wood except oak equal to it; and we have an instance of a cart-house, which has been built with English grown fir upwards of 70 years, now almost as perfect as when new.

If

If therefore the uses of oak timber for domestick purposes can, as undoubtedly many of them can, be supplied by other timber, of which there are such amazing quantities daily planted; I think we need not be afraid that the scarcity of oak timber for ship-building will ever be alarming. Let us at least first be convinced, that *the price rises*, before we believe that there is any scarcity at all. For it is as evident, as that effect follows cause, that there can be no real scarcity, so long as the price continues nearly the same, much more when that of the crooked pieces, so indispensably necessary in the construction of a ship, are sunk from 25 to 30 per cent.

The subject of trees and timber has been my favourite study, and my daily employ, for near 30 years. The number of trees that have been planted under my direction, and the quantity of timber of which I have had the disposal, have been greater than can fall to the lot of many men. Any communications which the society may at any time wish on this subject, shall be given with the greatest pleasure,

By their and your obedient servant,

THOMAS DAVIS.

P. S. Since

P. S. Since writing the above letter, I have seen large quantities of oak timber in Devon and Cornwall, cut down merely on account of the high price of bark; the buyers of which offered to sell the timber again, as soon as they had stripped (viz. barked) it, from 6d. down to 4d. a foot; and yet this timber was fit for building small coasting vessels, for which the demand increases, as that for ships of war decreases. Does this look like a scarcity?

If there should be a likelihood that the vast demand for bark, particularly in Ireland, will occasion much timber to be cut in waste, merely for the bark, the society would do service to the publick, by offering *a very handsome reward* for a chemical preparation, to answer the purposes of oak bark in tanning leather. It has been many times attempted with some degree of success; but the principal objection has been, that the price would be too great for general use; but when it is considered that the same bark which sells in England at 4l. a ton, is now worth more than 9l. in Ireland; a chemical preparation which would answer as well as bark, after the rate of 6l. per ton, would serve Ireland, and keep the English bark at home (where there is no fear of a demand for it) at the price at which it is now sold.

## ARTICLE XX.

*On Smut in Wheat; new method of sowing by Hand, &c.*

TO THE SECRETARY.

SIR,

IN the 5th volume of the Society's Papers, Art. 17, I observe an anonymous writer on the smut in wheat, who professes to have made it a subject of enquiry, assert, it is caused by a cold wet season when in bloom. He must have been very inattentive not to have observed, that smutty ears not only never blow in any season, but have never any signs of that which, appearing on wheat ears, is called bloom, and which in ears of wheat are to be found inclosed, by opening the chaff before blowing; but if the weather at that time prove cold and unfavourable, so much as to prevent the chaff opening and the bloom from being discharged, no grain is produced therein, as it causes what is here technically called a *miss* in the ear: therefore if the weather has any thing to do with the cause of smut, (which I doubt) it certainly must be in a much earlier state of vegetation than your correspondent supposes; for the smut is to be discovered as soon as the wheat is podded; and immediately on the bursting of the pod, if the ear be picked out, it will  
be

be found to contain a very small green bud; and if that ear (before ever having been exposed to the atmosphere) be rubbed on the hand, it will give out that disagreeable odour, of which we are very sensible in the more advanced stage of it, but contains not the least appearance of what is deemed bloom in a wheat ear; therefore, I apprehend, his smutty wheat in the cold wet summer proceeded more from the preceding damp harvest, whereby the seed was more infected with the disease (which I have observed) than from the season in which it grew. I am willing to admit his argument, that none but he who can repel blights can reward the husbandman; but hope that the society will not on such grounds stop their enquiries. The physician might on this principle withhold his aid; for we all know that man must die, but nobody knows when, and all wish to postpone the day. He is very far from having proved that blight is the cause of smut: from many years close attention to this enquiry, I am certain it generally is not; for I cannot cause a blight, but certainly can the smut in wheat, either in a wet or dry summer. I never discovered any difference in the roots or knots, but it is to be distinguished by an attentive observer, before it comes to ear, having more the appearance of a wild oat than wheat, the leaf is of a darker green, and so is the ear on its first appearance.

Sir



Sir T. Beevor's drill roller is, I think, an implement well adapted for wheat which requires a close bottom, but I should prefer drilling for barley, as it delights in a warm loose situation; but as the well looking of Sir T. Beevor's work depends in a great measure on the corn being well sown, and as through most countries, I have observed that business is generally badly done, I am induced to send you what I think the greatest improvement the old husbandry has met with in this century; (I have not seen it practised elsewhere, nor any account of it in the agricultural publications) that is to say, the *new method of sowing by hand*; the old method was to sow in warps, viz. 20 furrows at the time, proceeding down the right hand side of the warp, and returning on the left side, casting the seed with the right hand across the warp, the whole was finished, and probably, as either going or returning the seedfman was obliged to cast against the wind, the work was badly done. By the new method, the seedfman always casts before the wind, takes a less quantity in his hand, and advances seven furrows each time, which is about three times over a warp, exactly as tiles are placed; if in the beginning he proceeds to sow with his right hand, at the end he advances seven furrows and returns sowing with his left hand, proceeding alternately with his right and left hands, till  
the

the field is finished; the only care required is to deliver the corn thin on the mark, by which method it is in all weathers accurately sown, and not liable to be hand-platted.

I have for several years drilled the greatest part of my corn, and have experienced that seven inches is the most profitable distance for the farmer; nine and ten inches is too far (except on very rich land) as in thin land, the corn will be too much exposed to weeds and injury by dry weather. It was my *former* practice, and I am satisfied I was right when I relinquished it. Nothing has depressed the spirit for drilling so much, as the fallacious idea held forth and maintained by its enthusiastick advocates, that large crops may be obtained with little seed, and rows at a great distance; the despicable crops I have seen from such management, could not escape the observation and censure of those of another opinion, when a generous distribution of double the quantity of seed would not only have prevented the ridicule, but have been doubly advantageous to the theorist. Some seed may no doubt be saved, and enough to pay the expence of drilling; I never drill less than two bushels of wheat, seven inch furrows, and three and half barley; whatever may have been said to the contrary, I never found the old farmers so shallow  
pared,

pated, as to withhold themselves from what they *saw* a successful practice, consequently this mode of drilling is generally adopted in this part of Kent, the event justifying the practice. Drilling has been in vogue here near 40 years, and I believe the work no where better done, or better implements for the purpose. I wish you could persuade Mr. Wimpey to favour me with an account of his five-furrow drill, in the 4th article.\* There is no farmer in this country of 40l. per annum without a drill, and I have no doubt would procure better were they to be had on easy terms.

Being surrounded with water, and much infested with rats, I have tried various recipes without effect viz. the Miller's infallible powder, Dutch powder, Northy's specifick, arsenick, sublimate and opium, all which have been eaten without destroying, I verily believe, five rats; we never found more than two. Perhaps the society may be in possession of a specifick for this kind of vermin; surely it is a desideratum in rural œconomy, and well worth enquiring after. I will thank you for the best recipe you have.†

Your most obedient humble servant,

JAMES WYBORN.

*Hull, near Deal, Feb. 17th, 1792.*

\* This drill is now at the society's rooms, and is partly described in this volume.——† A premium is offered for the discovery.

## ARTICLE XXI.

*On the Smut in Wheat continued, by the same.*

SIR,

*Nil Desperandum*,\* is a motto that every man who wishes to investigate abstruse subjects, ought always to have before him. Is not smut ball a substance in its nature generated through a wheat grain and its plant? Strange and absurd as this hypothesis may appear to us at first sight yet if we reflect on the various phenomena in the animal and vegetable system, that daily present themselves to us, we shall not think it not altogether unworthy of our attention and enquiry. The ostrich, we are told, tramples her egg to warm sand to produce its progeny; the blackow, we know, in our own country, depends on the incubation of the hedge-sparrow to produce, and afterwards to its fostering care to nourish its young, till it is able to procure sustenance for itself. We see the mistletoe produced and nourished by various kind of trees, the like of many species of moss; cabbage producing colliflowers, and colliflower seed cabbages, and mules partaking of both. We know divers insects are produced on and within vegetables; but to come nearer to the question: as well as smut ball, cockle  
grows

grows in the ears that nature seemed to have formed for wheat, and (as in smut) I have seen ears which contained part cockel and part wheat; may not this possibly proceed from an imperfect generation? I never knew, or heard it asserted, that ear cockel (as it is called) was ever found amongst wheat, where it was not observed in the seed before sowing; that it grew spontaneously, or was caused by an untoward season. It is a small, nearly black berry, about the size of a smut ball, the flour is greyish; that part of the ear which contains them, I am informed, does not blossom, as I have observed by smut; and I do not recollect ever to have seen it grow amongst any wheat but the old Kentish brown, of which there is now very little sown in this part of Kent. I shall leave the field open for other opinions, by only saying, it may possibly be produced in this manner, or be a disease, as I have observed in the last volume of Young's annals.

It is sufficient for the farmer to know the fact, that smut is generally produced by smut; at least that it *can* be so produced; but how that is effected, we must leave to Lewenhoc, and other nice observers of the works of nature;\* for whether, as I

\* See the contrary opinions maintained by the writer alluded to in a following paper.

have said before, it is produced by generation, or is a disease, it is immaterial, if we know a remedy that will stop its progress, either by curing the latter, or rendering impotent the former. A solution of sublimate, arsenick, or other caustick alkali, my experience tells me, will answer our expectations; that of arsenick is a safe, clean, and *cheap* remedy; a first consideration to a practical farmer! But we are told in your 5th vol. p. 245, “that it is so dangerous and absurd, that men of common sense are afraid and ashamed of the practice.” Are then mercury, antimony, opium, and bark, the basis of the *Materia Medica*, to give place to powder of poft, because in injudicious hands they have produced the worst consequences? and their prescribers be accused of wanting common sense? Surely not. Herculean diseases require Herculean remedies; the solution of arsenick has not been used only on an acre or two of land by way of experiment, but on *hundreds* of acres, to the entire satisfaction of myself and other farmers that have used it; and they may rest assured (provided the corn be sown within 24 hours after immersion) that no danger will arise to the seed, although it may have been many hours in the water, and no lime used; but as the weather at that season is uncertain, it is best to wet it as you have occasion; fifteen minutes is sufficient for its be-

ing in the water, and it will be dry enough for sowing in an hour or two after; if any suspicion of smut in the seed, it may remain some hours in the water without injury. I use no lime, it drilling better without.

This is the practice of, Sir, your most obedient humble servant,

JAMES WYBORN.

*Hull-Place, Feb. 22, 1792.*

P. S. My gardener, a very ingenious Scot, has often assured me, that in the early culture of cucumbers in frames, on finding a female open and expanding herself before any male was present, he has had recourse to a little dry dust from the border, which has so tickled her fancy as to produce in a few days as fine a cucumber as the farina of the stoutest male could have effected; if this be true, (and I have no reason to doubt his word) surely it militates against some received opinions. This experiment is easily tried by any who wish to be better satisfied. We read that the dust which arises like smoke from that species of fungus called puff-ball, appears on a microscopic observation to be the embryos of that species, or so many little puff-balls. I wish those who have an opportunity would thus examine the powder of smut ball.

## ARTICLE XXII.

*Thoughts on the same Subject.*

TO THE SECRETARY.

SIR,

A Gentleman put into my hands the five volumes published by the order of the Bath Society for the encouragement of Agriculture. I have perused them with much pleasure and great attention, and think in general the subjects treated of are carried to great perfection. We have an old adage, *A word to the wise is sufficient*; if by a few hints I can any ways assist the gentlemen concerned in that laudable institution, it will give me much satisfaction.

The subject I have contemplated on most, is,  
*What are the causes which produce the Smut in Wheat?*

The following I suppose are the principal:

1<sup>st</sup>. Avoid sowing infected seed, procuring it from a friend you can rely on.

2<sup>dly</sup>. After having properly watered your seed, (no brine required) *lime it plentifully*, for I think much depends on this process, to keep the seed from



injury whilst it lies on the surface of the ground, or but slightly covered; for I imagine the *disease* then begins, and continues 'till the smut-balls are formed; besides, the lime acts as a stimulator after it is effectually covered.

If the injury be owing, as some of your correspondents have supposed, to the inclemency of the weather at the time of blooming; what shall we say, when we see two adjoining lands, for instance, in a common field, belonging to different occupiers, who used different feed, begin their blowing at the same time; one shall be almost free from smut, and the other very much injured? This cannot be owing to the atmosphere, for they have both the same.\*

Every grain, when committed to the earth has, or should have, its embryo perfect; and having absorbed some moisture, a fermentation commences, and the fixed air in the corn begins its motion, and by a rapid circulation warms the germ and its concomitant parts; some part at that juncture receives a check, and a mortification ensues, but in so small a way as not to affect the great progress of vegetation, 'till nature has almost finished her work.

\* See Mr. Wimpey's opinion on this point, in his next letter.

To prevent this malady, having got good seed, limed after the usual manner, sow early before the severe frost begins; for I imagine it perforates the grain, and wounds some part of it. Sometimes in a very wet morning the lime is washed from the seed, and this contributes to produce smut. At present this is chiefly ideal, not sufficiently authenticated by experience. The purest seed, if sown dry and late in the autumn, will most probably turn to smut, to the very great loss of the farmer. We know good and smutty corns are produced in the same ear. Is it very improbable but nature has given to each grain a tube or conductor from its root? If so, it may account for my hypothesis.

I have taken the liberty to trouble you with my thoughts on this very interesting subject, supposing, under your patronage, it may undergo a farther investigation.

I am, Gentlemen,

With great respect,

Your obedient servant,

*Maidenhead, Berks.*

W. R.



ARTICLE XXIII.

*Further Remarks on the Cause of the Smut in Wheat ;  
and on planting Potatoes.*

In a Letter to the SECRETARY.

SIR,

**I**N a former letter on this subject, I mentioned my having then more experiments on foot, with a view to the further investigation of the cause of the smut in wheat; I now do myself the honour of requesting leave to submit the result to the consideration of your very respectable Society,

It is true, that, although those experiments were numerous, they have afforded no new discovery; I mean nothing different from the result of those I formerly related; yet I think they may be of great use, as they may serve to corroborate and confirm the opinion I maintained respecting the cause of an evil so extensive and alarming.

To give a circumstantial relation of each experiment would be both tedious and unimportant; suffice it then to say, they were made with sound corn picked out of smutty ears, set at different times and on different soils, prepared by steeping in different liquors;

liquors; some in simple water, and some without any preparation at all. The result was, that one smutty ear was not to be found in any one of the experiments.

It is true indeed the wheat of last year was in general pretty free from smut; but if the cause of the evil originate in the feed, and not in the season, the produce of the above experiments would have been just as liable to the smut, being taken from smutty ears, as in any other season whatever.

Some of the seed of those experiments was steeped in a solution of salt, some in a lixivium of wood ashes, some in a solution of sugar, some in strong ale, some in clear water, some were set dry as they came from the ear; but at harvest there was no perceptible difference, either as to strength of plants, or soundness and plumpness of grain. I could not perceive that any advantage had been gained by any of the infusions made use of, excepting that the corn from the unwashed seed abounded much more with weeds, than that from the seed which had been steeped and washed; which was rather contrary to what I had hoped and expected, from a former experiment of steeping, which seemed to promise an increase of fertility and produce.

There

There is one experiment, however, I would beg leave to relate a little more particularly :

The first experiment I made on smutty wheat was four years ago, on some sound corns I picked out of a smutty ear of white wheat, said to be originally from Canada. The corn from this seed I have continued to plant ever since, to try if there would be any return of the original taint, or symptom of that disorder. The produce ever since has been not only free from it, but the grain remarkably plump and fine. In the harvest of 1790 the whole of it was nearly destroyed by birds. I did not save a tenth part of it, and that from the weakest and latest ripe ears ; however, I saved all I could, and planted it in my garden the August following; and to prevent a like devastation from the birds, I had part of a ridge dug in the middle of a field of wheat reserved for that purpose, and in February following transplanted it there in rows, at 9 inches distance, and 6 inches apart in the rows; when the plants were about a foot high, they were completely eat down by the hares, and I thought them destroyed irrecoverably ; but they soon shot up again, and at harvest produced as long and fine ears, and plump sound good corn, as I ever saw. The produce was at the rate of  $37\frac{1}{2}$  bushels to the acre, and the

the weight of the bushel 72 pounds, 9 gallon measure. The soil a poor binding loamy sand, which if undisturbed soon grows mossy. It had borne six drilled crops in succession, four of them wheat, without any manure whatever.

From this and some other observations I have made on transplanted wheat, I am convinced no mode of practice would equal transplanting as to quantity of produce; but from the great labour and expence, and number of hands it would require, that mode of cultivation on a large scale is absolutely impracticable, and therefore not to be thought of. But to return to our subject.

Some who favour the opinion that the cause of the smut is from the depravity of the seed, have observed, that “when two adjoining fields have begun their blooming at the same time, but belonging to different owners, and therefore sown with different seed, one shall be almost free from smut, and the other greatly infested with it; this cannot be owing to the atmosphere, (say they,) for they have both the same; now what then can be said to this by those who suppose the smut is owing to the unfavourableness] of the weather at the time of blooming?

I answer,

I answer, the objection seems calculated to give countenance to their opinion, but it by no means enters far enough into the business to investigate the truth; for though the fields are contiguous, and their atmosphere equally so; correctly and truly speaking, the latter may be no more the same than the former, probably in respect to quality far more different. When we speak of the atmosphere, we mean, not only the circumambient air, but every principle of whatever nature or kind that floats in it. These are sometimes of a very malignant nature, and extend far and near, but are frequently confined to a kind of stream or current, like water in a river, and affect those objects only which stand in their way and obstruct their passage. It is not very uncommon to see trees and plants blighted and blasted on one side, while the other shews not the least sign or mark of being injured. Such partial sufferings happen at times to almost every field, and every kind of plant it bears.

It hath many times fallen within my observation, that the east and south sides of a field of wheat have been exceedingly smutty, when the north and west, and the other parts of the field, have been little affected by it. But further, we have frequently found both sound and smutty ears growing from the  
same

same root; and what is still more, sound and smutty grains, at the same time in one and the same ear. To imitate our objectors, then, and attempt to obviate one difficulty by starting another; will they permit me to ask what they can say to this? If smutty seed infallibly produces a smutty crop, as they maintain, what produces the sound ears which grow out of the same root with the smutty ears, and the sound grains which are found in the same ear with the smut-balls?

This single observation clearly refutes their whole argument. It is an established maxim in physicks, “that the same *causes* infallibly produce the same “*effects*,” and were it not so, human knowledge of any future event would be an impossible thing; for this is the principle which directs actions to ends; without it, intention or design would have no object. To say then that both sound and smutty grain proceed from the same root, which root is vitiated and depraved, yet is the efficient cause of both, is as palpable a contradiction as to assert, that good wholesome blood, and a putrid, malignant, poisonous ichor, may be taken from the same vein at one and the same moment.\*

\* A friend of Mr. Wimpey's, on reading this remark, observes, that even this may be possible. The stream of the same moment may contain good and highly contaminated particles.



It is universally admitted, that the smut mostly abounds in cold, wet, inclement seasons. If the smut then, as these gentlemen think, proceed from corrupt or vitiated seed, we should find most of it the year following any year in which it much abounded; for if it proceed from smutty seed as its sole cause, as they maintain, certainly every succeeding crop would increase in smut, as the quantity of smutty seed sown would in some degree at least be in proportion to the quantity of smut in the crop of the year preceding; therefore, if this were the case, the smut would annually increase, till in a very few years we should have none that would be free from smut; that is, it would be all smut, and we should have no wheat at all; for smut-balls contain nothing but an effete stinking powder, totally destitute of every principle of life, and therefore never vegetate at all. But this is so far from being the case, that a very smutty year is often succeeded by one that has little if any smut. This generally happens as often as a damp, cold, inclement season is succeeded by one that is warm, dry, and favourable to the growth and ripening of grain.

In short; it is not easy to enumerate the arguments that might be adduced in support and confirmation of the opinion here advanced; I shall therefore

therefore content myself with the recital of the two recent cases following:

In the year 1790, a near neighbour of mine, an intelligent farmer, in a large way of business, procured a sample of very fine, clean, sound wheat, of which he purchased enough to sow a large field. The rest of his land he sowed with wheat of his own growth. From the seed he had purchased he hoped to reap enough good corn to supply him with feed for his whole crop the following season, but at harvest how great was his disappointment! The produce of the purchased seed turned out very smutty, whereas the crop from the seed of his own growth had none at any in it.

Another farmer, who lived about a mile from me, being rather in low circumstances, was induced to sow, the same season as above, some very smutty wheat he had by him; it not being convenient to purchase good clean seed; but very fortunately for him, his crop proved as clean and as good as any in the neighbourhood, having very little if any smut in it.—These cases are far from being singular, for many such have come to my knowledge.

Now if any advocate for the opinion that the smut proceeds from seminal corruption or depravity, will  
account

account for the possibility of these facts consistently with his own principles, I will be one of the first to vote him a statue to perpetuate his fame for inimitable skill in the solution of difficulties.

### Of POTATOES.

I formerly had the honour of submitting to the consideration of your Society (vol. v. p. 230.) an account of an experiment to discover whether whole potatoes or cuttings are to be preferred in planting. —From that account, it clearly appeared, that the advantage lay greatly on the side of cuttings. But as, from long experience, I know conclusions drawn from single experiments cannot be safely depended on, and the result of that experiment differing so widely from an account given by a very respectable correspondent of the Society, whose accuracy is well known, and of whose probity and veracity I have the highest opinion; I resolved to repeat my former experiment as exactly as possible, by way of establishing a fact so interesting to the public if found just, or of retracting an error if it should appear to be one.

In the spring of 1791, I prepared about three acres of ground, and in April planted it with potatoes.

tatoes. A certain quantity of the largest and finest were selected, one half of which were planted whole, the other cut into pieces of a moderate size. An exact account of each was kept at taking up, when it appeared that the acreable produce was much the same as in the former experiment; but as the cut potatoes planted nearly four times the ground that the whole sets did, the advantage lay in the same proportion on the side of planting with cut potatoes; therefore I think there cannot be the least doubt that the preference is to be given to cuttings, as the success of the two experiments so nearly coincides.

I have been used for some years to furnish my neighbours with potatoes for planting. The last season one of them desired I would let him have them all small. He said he had planted small ones several years, that he found them equally productive with the largest, and saved much trouble in cutting. Others preferred the largest, who carried their economy much further; they it seems used to pare them, eat the fleshy part, and plant the rinds only. Upon enquiry, I found it was not an unusual practice among the cottagers, and I have been credibly informed they get as large crops and as good potatoes in that method of planting as in any other whatever. If this be a fact, it seems to appear that  
the

the fleshy part of the bulb is of no use in supplying nourishment to the young fruit after the fibrous roots have put forth and laid hold of the ground. Perhaps an experiment of this sort may be thought worth making.

I am, Sir, your most obedient servant,

JOSEPH WIMPEY.

*Bratton-Clovelly near Okehampton,*

*Devon, April 1792.*

#### ARTICLE XXIV.

*On the best Method of providing for the Poor.*

WITH PRELIMINARY AND SUBSEQUENT CONSIDERATIONS, BY THE SECRETARY.

THE materials which compose the former volumes of this Society, are for the most part a recital of experiments and practical opinions in the great department of Agriculture. To advance the knowledge of that science was a primary object in the institution of the Society, and it is confessedly an object, in every enlightened country, paramount to every other consideration. The favourable reception

ception these volumes have met with among the landed gentlemen, and liberal-minded farmers, may be considered as a proof that the proceedings of the Society have not been unsuccessfully devoted to their main end.

The papers contained in the present volume, though a continuation of former exertions in the publick cause, will be found to embrace objects of improvement beyond the common province of the farmer. Among them that of planting, the embellishment of estates, and the provision of a national store of oak timber, are considered as particularly worthy of the publick attention; the attention especially of opulent land-owners, who possess from that opulence, and from their leisure, powers of exertion peculiar to themselves. In this class of the community there are obviously other powers of doing good, which, happily exerted, must redound to their lasting honour, and no less to the happiness and solid glory of their country. Nor will it be a circumstance of small encouragement to an exertion of their natural influence, when an object shall be held out, in the accomplishment of which the manufacturer and the sedulous tradesman are found qualified as able coadjutors. To the latter description of citizens it will also afford much encouragement,

to be supported in their efforts by the weight and influence of the former. To both, it must be a strong inducement to a cordiality of exertion, where the end to be accomplished by their joint endeavours is dictated at once by political wisdom, and the benevolent laws of the Supreme Being. The object which, by the encouragement of the proper committee, I am induced to consider in this paper, is,

### THE BEST METHOD OF PROVIDING FOR THE POOR.

This is an object which needs no apology in a work like the present; it is a most important branch of political œconomy, closely connected with the general good, and, in the present state of the country, of immense magnitude.

A learned and truly respectable Physician, a Vice-President of this Society, gave, in a former volume, his thoughts on the most simple and obvious means of preserving the health of labouring persons, employed in agriculture. That paper has been received with the praise due to its merit, and will be regarded as a valuable directory to the benevolent farmer and master, studious of the health of his servant. It is with due respect to equal benevolence,

lence, and due deference to superior abilities, that a servant of the Society presumes to follow him in reflections for the comfort and happiness, not only of the same class, but of every class of labouring people.

A patriotic senator\* was employed for a series of years, in framing a bill for the regulation of the *Poor Laws*, and thereby to lessen the general burden of the country, by simplifying the parochial management, guarding against the suffering of the worthy, and the impositions of the idle and licentious poor. What, if any, will be the result of his labours in parliament for these ends, is yet to be proved. Every friend to the general happiness of mankind, must wish that such a bill may be adopted at last, as may tend to the aid of virtuous indigence, and the most effectual correction of publick abuse. While this great and difficult subject shall be in agitation, it is much to be desired, that gentlemen of leisure and talents in different parts of the country, would give that attention to it which the liberal views of so active an advocate have invited, and which its importance so loudly calls for.

In every civilized country its interior political œconomy, which involves the moral good and the

\* Mr. Gilbert.



social comfort of a large proportion of inconsiderate and impotent persons, is a study highly worthy of the philosopher and the Christian.

In this country, possessing as it does, in an eminent manner, various local advantages, the lights of knowledge, the freedom of religion, and comparatively happy in the freedom of its government; such men are peculiarly called on to exert their talents for the prevention of misery, and the promotion of general order and happiness in the subordinate classes of Society. The perfect attainment of these ends, by national laws and regulations, is not to be expected. Human laws, the schemes of human imperfection, and which are necessarily in some degree theoretical, must ever be inadequate to the production of perfect virtue, and consequent felicity. It is sufficient if they be the best that human prudence could devise, to answer the best ends. Such laws will at least serve as general securities of order, union, and prosperity. But after all which the wisest policy can enact, a large field will remain open for the more private offices of the active and benevolent citizen; and whatever can be privately done, by plans of local œconomy, moving on the provident principles of morality and virtue, will be so much in aid of the wisest laws of the state; or  
rather

rather it will supply the natural and necessary defect of them. What can be more worthy of a wise and good man, than to be employed in effecting a good, which a *government* cannot accomplish, and that by exercising, most to his own rational delight, the benevolence of his own mind ?

*Of the Vagrant Poor*,—those who under various pretences wander about the country without any visible means of getting a maintenance, and who furnish but too common a suspicion of their being worse than sturdy beggars,—we shall say but little. As vagrants, the laws now in force provide for their being treated as they too generally deserve ; and if such persons were more frequently taken into custody, and compelled to give an account of themselves, it would be equally good in its consequences to them and to the community. In this respect the activity of magistrates, in punishing the idle and profligate on the one hand, while on the other they exercise their authority in their districts, to prevent parochial oppressions, and neglects of duty towards the distressed, will prevent much irregular strolling, and correct the motives to it. This very important part of a magistrate's duty, though in itself an unpleasant and invidious one, cannot be too much commended,

wherever discharged with a due regard to justice and humanity. The character of such a vigilant and worthy magistrate will operate to the terror of idle wanderers, while the casually distressed poor traveller will be secured from famine, and the bitter temptation to steal.

But the classes of poor for whose benefit this article is principally intended, are, the resident labourers in husbandry, manufactures, and mechanics. Such may be said to form the bulk, and the valuable bulk too, of the people in this country; to render their poverty the least irksome to themselves and to the publick, and as much as possible to *prevent* poverty, will be allowed in every point of view to be a work of exalted charity and universal benefit. It wisely anticipates natural evil, by the timely application of moral principles. This we may fairly hope is practicable in most parishes, because it has been found easily practicable in various situations.

The establishment of Provident Societies, for a provision in health against the day of sickness, has been tried, and wherever it has been tried, the effect has been uniformly good. The mode of this provision has been in its outline generally the same,  
i. e. by

i. e. by inducing the labouring classes to appropriate some small part of their earnings to a fund, from which they may draw succour in the hour of need. This plan has indeed sometimes originated with the most sensible of the poor themselves, and has been carried into effect without much patronage from the wealthy. But where the latter have been active in aiding, by their example and protection, this commendable disposition, it has succeeded in a proportionable degree. And so considerable in some instances has that degree been, as to make it a matter of surprise that such œconomy has not been universal! The reason, indeed, of this defect of exertion is to be found, where every other moral defect has its origin; in the natural propensity of the human mind to do those things which ought not to be done, and to omit those which should be performed.

To dwell on a moral defect is a far less pleasing task, than to urge the wisdom and happiness of doing well. This, therefore, we will endeavour to do, as the most likely means of engaging that attention, which may be favourable to the end in view. Now with every common deduction from the *goodness* of human nature, it seems obvious that the mind of man is prone to *commend*, at least, the amiableness

amiableness of virtue, and sincerely to approve those deeds of social kindness which appear most conspicuous in any character. Never, perhaps, was there an institution, well-planned by human foresight for alleviating human misery, that did not sooner or later gain the applause of the publick. The virtuous active citizen, wherever he has been found devoting his labours and his wealth to the protection of the indigent, the maimed, or the sick, has been generally beloved while living, and his memory after death has been honoured and revered. The hero may be remembered, from the splendor of his devastations, with a mixture of admiration and disgust: the sage will be renowned for the acuteness of his judgment; but it is the character formed on the principles of "the Man of Ross," that excites the tribute of universal esteem. Such a tribute produces a reflected pleasure on the mind that bestows it; while the benevolent feelings of that man who deserves it, are his own highest reward. They preserve in his bosom a perpetual glow of delight, with which mere amusement or sensuality can never be connected,

Various have been the outlines of plans, submitted to the publick examination, with a view of bringing the subject before parliament, so as to  
obtain

obtain a *national* reform, by authority. But improvements by institutions of authority, have long been waited for in vain. Some have held forth the necessity of large buildings under the names of work-houses, houses of industry, &c. to be established in certain districts through the nation, for carrying on different branches of manufacture, by means of the indigent, who should want relief; thereby supposing that such poor would be more certainly employed, more regularly superintended; better provided for, and at a cheaper rate.

Others have reprobated that system *in toto*, and maintained that while such houses would be attended with an enormous expence of building, they would do nothing towards lessening the general burden; but that the poor in them, committed as to so many jails, would be rendered unhappy; their morals, from a crowded way of life, would become more corrupt; their labour would be less, and their work worse done; consequently, that manufactures would be injured: that the maintenance of the poor would cost more, and that the peasantry would be enervated by such early confinement and restraint.

Under such contradictory opinions, the subject has received but little elucidation; and the uncertainty

tainty of a new national regulation continues as great as ever; while, notwithstanding the flourishing state of most manufactures, the poor-rates are making a constant advance. The last circumstance must prove, either that population has been rapidly increasing, or that the system of managing the poor is daily becoming worse. The former of these may be true; the latter cannot be the case, without a national degeneracy in the morals and habits of the poor. To obviate such a probable evil, as well as to lighten the general burden, it has been a favourite theory of several intelligent writers, that the poor may be made to maintain themselves. Under the pressure of insufficient millions of expenditure, this should seem a paradox; and yet so plausible, and indeed rational, have been some calculations, that the possibility of almost realizing such a scheme, is not void of hope.

Among the most ingenious of those schemes may be considered that of Mr. PEW, late of Wellingborough, but now of Shaftesbury. His treatise, which is intitled *Twenty Minutes Observations on a better Mode of providing for the Poor*, seems to have been long undeservedly out of print, and not to have been known in proportion to its merit. As containing facts, respecting an association in one place, attended with remarkable success, and reasoning

soning very fairly from those so general advantages of the like nature; it has been thought adviseable by the Committee of this Society's papers to solicit the author's consent to its being republished at the Society's expence. And it was with particular pleasure that the Committee received his consent for that purpose in the most obliging terms. In justice to the masterly outline which this tract exhibits, and to the style and manner of the author, the whole is given without alteration.

*Twenty Minutes Observations on a better Mode of providing for the Poor ; in which it is rendered probable that they may be effectually relieved, in a manner more agreeable to the general Feelings of Mankind, at the same time that Two Millions sterling, or more, may be annually saved to the nation.*

By RICHARD PEW,  
Fellow of the Royal Society of Medicine, Edimburgh.

#### P R E F A C E.

Regulations which tend to increase the happiness of individuals, at the same time that they diminish the general burthens of the community, will command the attention of a discerning Legislature. The author flatters himself that both these ends may be in a great measure accomplished, by the plan he is about to propose ; and he therefore makes no apology for communicating his sentiments to the publick.

*Twenty*



*Twenty Minutes Observations &c.*

THE rapid and enormous increase of the poor's rate in this kingdom, during the last few years, has for some time created in the landed interest the most general and just apprehensions; many plans have been suggested, and many schemes devised, to remedy or diminish the grievance, but hitherto with little or no effect; nor ought it perhaps to be expected that the burthen should ever be totally removed, although it may be very much alleviated. At any rate, it is an object of the most serious concern, that its increase should, if possible, be prevented, and its pressure, as far as can be, equalized. To this end there is reason to hope that the bills lately framed by Mr. Gilbert may a good deal contribute; but is there not a possibility of doing something more? Those bills are rather calculated to correct the evil; may we not in some measure, by anticipation, prevent it?—In this persuasion, I shall venture to offer a few observations.—I believe it may be asserted with justice, that most of the distresses of the poor in this country are more artificial than real distresses; they do not depend so much on any difficulty in procuring the necessaries, or even the conveniences of life, as upon a total want of economy amongst the poor, in the management of what they earn;

earn; it being too much the custom with them (*ultimately certain of relief from the parish*) to squander immediately all they get, be it little or much; so that our manufacturers and labourers, with very few exceptions, are equally poor at the week's end, whether they have earned in that week a guinea or five shillings; the surplus in summer, or a time of plenty, instead of being laid up against winter, or a time of scarcity, is squandered away in at best what is unnecessary, and often in acquiring habits of idleness, extravagance, and intemperance, not easily to be relinquished. It is the business of a wise legislature to correct, if possible, this extravagant tendency of the people, and, where it cannot hope for a natural and positive habit of œconomy, to substitute, if practicable, a negative and artificial one; that some kind of equilibrium and uniformity may take place between the income and the expenditure of the poor throughout the year; for as matters now stand, (from this total want of œconomy) the wants of the labourer are greater in winter, when he has fewer means of supplying them, than they are in the summer, when he can earn much more; so likewise in the single state, and in the vigour of youth, a man's *wants are inconsiderable* to what they are in the married state; and in the winter of age, when from the diminution of his strength, or the increase of his family,

family, he is less able to supply them. Yet notwithstanding these facts are continually passing before our eyes, we find that mankind have not of themselves sufficient resolution to be economical, or to lay up any thing in health and prosperity, against the attacks of poverty and disease.

It has been my fortune to be placed in a situation, which obliges me often to visit the dreary mansions of the wretched, when the jaundiced eye of disease gives additional horror to the meagre countenance of poverty. With a mixture of sorrow, indignation, and pity, have I often seen a young man, capable of earning fourteen shillings a week, with a wife in perfect health, and *only one child*, reduced by a single week's illness to the necessity of seeking relief from the parish! whilst the furniture of his house, and the coverings of what was called his bed, were sufficient, from their filth and nastiness alone, to occasion disease in the most robust constitution. Could this extreme poverty proceed from any other cause than the most shameful mismanagement?\*

\* As a proof that it could not, I have now within my eye a poor honest fellow, who earns no more than six shillings per week, has five children under nine years of age, and his wife big with the sixth, who held out, notwithstanding, under a state of total inactivity, for full four weeks, without applying to a parish, and without running in debt.

and is it not the duty of every government to oblige such persons to be œconomical, whether they will of themselves or not, and to compel them, if possible, to lay up something in health and youth against the attacks of a numerous family, sickness, or age? It shall be my business to examine the possibility of putting an equitable scheme for this purpose into execution—let others determine how far it be compatible with the spirit of the British constitution.

In matters purely speculative, no certain conclusion can be drawn *a priori* of their success, when reduced to practice; we are obliged, therefore, to reason from the best analogies we can find, and to form our conjectures of the probability of their succeeding, by a comparison with other plans, which experience has proved to be successful. It is known to every body, that there are in this kingdom many associations under the title of clubs, or friendly societies, the object of which is to secure to the members of them, when incapable of labour, a certain sum weekly, during such interruption; of these I shall take for my example one instituted in this town\* about forty years ago, upon the same principle, I believe, as most other associations of this nature throughout the kingdom: every member pays into the hands of the Treasurer one shilling every four

weeks, which must be deposited for one year complete, before he becomes intitled to any relief from the society; after that period, when rendered incapable of labour, he receives six shillings per week for the space of six months; but if his incapability continues longer than that time, his pay is reduced to three shillings per week, which he receives until he gets well, or otherwise as long as he lives. The same provision is made for those persons who are rendered incapable of labour by age; for the first six months they receive 6s. per week, afterwards 3s. It also provides for burying the dead in a decent manner, and allows for each funeral three pounds. —This slender monthly contribution has been found so perfectly adequate to the purposes intended by it, that it has not only proved sufficient to defray every expence, agreeable to the conditions held out, but has also enabled the society, without risk, to return a guinea to each member every two or three years (the number 48) retaining many pounds as Bank stock.

The person who ties my hair has been in this association for the last seven years; he has £. s. d.  
paid annually thirteen shillings,     -     -     4   11   0

Without having received any thing on account of sickness, he has withdrawn at three several times one guinea,     -     3   3   0

Balance paid     1   8   0

So that in fact 1l. 8s. is all that he has disbursed in the space of seven years, or 4s. per annum; a trifling sum indeed, when compared with the advantages he might, if necessary, have derived from the institution; but after all there remains in stock 36l. 11s. one forty-eighth part of which, or 15s. 2½d. may be considered as his property, so that he has, in reality, in the course of seven years, *sunk* no more than 12s. 9½d. or 1s. 10d. per annum.\*

That the income of the fund may suffer no diminution or interruption, every disabled member continues to pay his monthly contribution as at other times, although he is upon the sick list.

Now if so small a contribution as one shilling in a month, or one twenty-fourth part of a common labourer's wages, be sufficient, for *forty years together*, permanently to maintain a fund *more than adequate* to the purpose of affording to each member a comfortable subsistence when afflicted with sickness, or exhausted by age, might not a fund be drawn from the people at large upon the same principle (almost without their feeling it when in health and prosperity) sufficient, or nearly sufficient, to support them in

\* Not above one-seventh part of the sum originally paid, three-pence per week.

time of sickness or in old age? In short, may not every parish be *induced, or compelled*, to form themselves into one or more friendly associations, to which each individual above a certain age (suppose males 18, females 17)\* should be obliged to contribute a small proportion of their supposed income, for the purpose of supporting them when unable to get their own livelihood?

Let us inquire what would be the probable effects when applied to a particular town; I shall as before take that of Wellingborough.

It appears by an actual and exact enumeration, made under my direction, that the number of inhabitants residing in Wellingborough amounts in the whole to 2857; that out of these 847 males, and 1100 females, are above the age specified; the sum therefore paid by these persons would be 847 shillings, and 1100 four-pences, every four weeks, amounting in the whole to 60l. 13s. 8d. or 788l. 17s. 8d. per annum.

The expence of the poor in Wellingborough, upon the average of three years last past, appears to have

\* About these ages, respectively, a spirit of independance usually becomes manifest; it is this spirit I wish to catch, and to preserve it unobscured through life.

been 1191l. 4s. 11½d. from which deduct 788l. 17s. 8d. there remains 402l. 7s. 3½d. or very little more than one-third of the present expences of the parish. Let this be applied to the whole kingdom, taking the expence of the poor to be, as in 1773, three millions,\* the saving to the nation will amount to the sum of 1,984,885l. sterling, a sum well worthy the attention of the legislature; and this might be raised in a manner so easy and gentle, and so perfectly congenial to the wishes of the people, as scarcely to be felt, much less complained of, by any individual, especially in manufacturing towns, where the poor are always the most numerous, and always the most wretched; since the sum here specified would seldom amount to one 48th part of the artificer's wages; yet the return, in the time of his necessity, would be much greater than it would be possible for the parish to afford him, however well disposed they might be, and however great his distress.

N. B. The computation here made is extremely moderate, since it allows nothing for the number of contributors prohibited from receiving,† the in-

\* I state this on the authority of Lord Kaims. Mr. Gilbert, who has been most laudably attentive to this subject, estimates the total expence at about two millions and a half.

† About one-fifth, which, it is supposed, will be nearly equal to the sum necessary for the relief of large families, of widows, and of orphans.



creased frugality of the poor, which may reasonably be expected, the prevention of imposition on parishes, (to an astonishing amount) by the clamorous and idle; the expence of removing paupers, the litigations concerning settlements, the number of payable males now absent in the army and navy,\* or the surplus which constantly takes place in all private institutions of this nature; all which circumstances taken together would certainly amount to a sum not far short of the 1,015,115l. unprovided for; nay, perhaps this institution may hereafter be brought, by proper management, to afford a considerable surplus for the use of the state; and thus the lower orders of the community, instead of being a burthen, would become, in every sense of the word, beneficial to the nation; whereas the poor laws now in being, however benevolent in their original intention, do certainly operate as a severe *tax* upon *honest industry*, and as a *bounty upon extravagance*.

“ In Doctor Davenant’s time (says Lord Kaimes)  
 “ the poor-rates were about 700,000l. annually; in  
 “ the year 1764 they amounted to 2,200,000l. in  
 “ the year 1773 they amounted to 3,000,000l.  
 “ equal to six shillings in the pound land-tax.”†

\* This was written in the year 1783, during the American war.

† Sketches of the History of Man. Sketch 10.

Now if they have increased in an equal progression since the year 1773, which there is too much reason to apprehend; they must (supposing this calculation to be just) have amounted in the year 1782 to 3,800,000*l.* sterling; and the saving by the plan here proposed will be increased in proportion, that is, to the enormous sum of 2,500,000*l.* and this, even admitting the whole sum now raised for the poor to be absolutely necessary, and that the deficiency of the sums raised by these contributions must be made up, how astonishingly great then will be the advantages to this nation, should the funds alone, as they probably will, prove adequate to the ends proposed by them!

Out of this fund every man, who is really incapable of labour, shall have a right to demand six\* shillings per week, for the first six months, should his illness last so long, and three shillings per week after that period, until he again becomes capable of labour; every woman should have a right to demand two shillings per week for the first six months, and afterwards one shilling and six-pence per week, until she is again able to work. I would also wish

\* I am inclined to believe that these proportions are not the best which may be adopted; but they are such as the people have chosen for themselves, and perhaps it might not be safe to alter them, at least for the present.

to extend the advantages of this institution, as a matter of right, to those industrious poor persons who are oppressed by large families, to the fatherless, the widow, and the orphan.\*

For I find upon enquiry amongst some of the most industrious of the poor, that it is almost impossible for a man to maintain a wife and three children, under nine years of age, upon six shillings per week, the wife's time being so much taken up in the necessary duties of her family, that she can, under such circumstances, earn nothing; with two children under that age they acknowledge they can do tolerably well, and after they are nine years of age they can, if in health, nearly earn their own maintenance; every common labourer or manufacturer then, earning no more than six shillings per week, having three children under nine years of age, shall receive from the fund one shilling and six-pence per week until the eldest of those children shall attain the age of nine years, or until one of them shall happen to

\* For there is no reason why the terrors of poverty should damp the instinctive parental joy, which ever accompanies the birth of a helpless innocent; why hunger should aggravate the affliction of the widow; or why contempt and indigence should necessarily embitter the irreparable loss of affectionate parents: no, let us mitigate these unavoidable calamities, as far as lies in our power, by a frugal, an unhumiliating, and a determinate provision.

die;

die; and if any one or more of his children shall happen to be idiotic, insane, or any ways so far disabled either in body or mind, as to be utterly incapable of labour, each of them shall be considered as if still under the age of nine years, and paid for accordingly. If a mother should be left a widow with three children, under seven years of age, she shall receive from the fund five shillings, if with two children three shillings, and if with one child one shilling and six-pence per week; if with more than three under that age, one shilling per week for each above that number, it being considered that all her time is taken up by three, and allowance made for it, but that she is capable of looking after and taking care of a greater number, which however will very rarely happen.

Orphans will be attended with somewhat more difficulty; the same proportions, however, should be allotted from the fund for their maintenance, and some receptacle provided for them, where they may be taught to get their own living by the age of nine years; and widows, without children, under the age of 65, may, when in health, be considered as able to get their own subsistence.

Providing thus early against the possibility of necessary poverty, will be attended with the most  
happy

happy effects, (for the positive advantages of this plan, however great, I consider as scarcely equal to the negative ones) cherish that spirit of independency which is natural to the human mind, and in a short time there will be found scarcely a really poor person in his Majesty's dominions.\*

It is with the poor man as it is with the tradesman; the latter, as long as the balance at the year's end appears in his favour, and he adds something annually to his capital stock, continues unremittingly to exert himself to the utmost of his abilities; but if, notwithstanding his exertions, the balance of trade goes against him, and he finds his capital annually decreasing, he begins at first to look into his accounts with reluctance, then neglects them altogether, and at length seeks relief in continual dissipation.

So it is with the poor man; as long as he continues in perfect health, his earnings are generally sufficient to procure him a comfortable subsistence; and if he

\* The truth of this idea may be inferred from hence, that upon the most strict enquiry I do not find more than one or two instances where any member of the association became chargeable to the parish; and these were under the pressure of very large families, labouring under general sickness, both which circumstances would by this scheme be provided against.

is in debt to no one on Saturday night, he lays himself down contented. Let us suppose him now afflicted with a few days illness, that his credit is good, and he runs a little in debt; as soon as he recovers, he makes some efforts to pay it, but before he can accomplish this, a second illness overtakes himself, his wife, or his family, his debt of necessity increases, and at length arrives to such a height, that he sees it is impossible, by any exertions he can make, to recover himself; he feels hurt at the idea, his spirit is broken, and if no one from charity, or good policy, steps in to relieve him from his present dilemma, his desire of independency is lost FOR EVER; he applies to the overseers for relief, and having once surmounted the pride natural to man, and been beholden (as they call it) to the parish, he is determined to get as much from it as he can; and thus, by an aggregation of such cases, the poor's rate is extended beyond all bounds. Such is the progress of the human mind, in the lower orders of society, as I have too frequently had occasion to observe.

Let us now turn our eyes to the scheme here proposed, the easy practicability of which may be inferred from the general tendency of the people, both male and female, to run into such associations, under  
many

many difficulties, in every part of the kingdom, and its probable effects we have traced at some length before. It is true these associations are, at present, chiefly composed of the more industrious part of the people, the lower class of tradesmen; but we have made ample allowance, as I think, for the most considerable difficulties which can possibly arise, even amongst the most necessitous part of the community. Could such a scheme be carried into execution, many advantages would arise to the kingdom, independent of the increase of population, the relief it would afford to the landed interest, and stability it would give to public credit. By it the youthful, the vigorous, and the active, would insensibly become the supporters of the aged, the infirm, and the diseased; the single man, finding that he must contribute to the support of the married man's children, would find it his interest early to obey the dictates of nature, and marry likewise, from which he would no longer be deterred, by the fear that himself and his offspring might become beggars.

Equally and enviably secured against the inconveniencies of poverty or riches, supporting and supported in turn by his fellow parishioners, the peasant would pass his days, the father of a numerous and vigorous offspring, in ease, tranquillity, and peace.

As

As all would be interested in the stability of the fund, each individual would become the overseer of his neighbour; and as all would be provided for upon an equal footing, no discontent could arise on account of partiality; whilst every one being secure of a comfortable and *determinate* subsistence, there could be no temptations to vice from necessity, and it is to be hoped fewer than at present from example.

The indolent man, not contributing his quota, would be equally obnoxious to the squire and to the peasant; and as from his deficiency he would be immediately detected, so his idleness should inevitably meet its proper antidotes, confinement and labour.

By proper certificates from one association to another, the detrimental, expensive, and often inhuman removal of paupers, generally under a state of disease, and frequently in the agonies of death! would be rendered unnecessary; the amiable longings of those individuals (who have gained settlements at a distance) to pass the evening of their days in their native place, with their earliest friends, relations, and acquaintance, might be safely gratified; the litigations between parishes concerning the settlements of paupers would be heard of no more;

the



the petty shufflings and underhand tricks to evade or diminish the poor-rates, so common at present, would be annihilated, and every human being, without fear or molestation, would be enabled to seek his subsistence wherever his genius, his inclination, or his interest, might lead him; but, above all, the sum of human happiness would be considerably augmented, by the comfort which every man of moderate desires and independent principles must feel, when he recollects, that whatever accident can befall him, to deprive him of the power of getting his subsistence, he is certain of a comfortable maintenance, without any disgrace to himself, or any obligation to others. “ In the days of my prosperity (says he to the Treasurer of the fund) I deposited a sum of money in your hands to support me when I should fall under the pressure of adversity; that period is now arrived, I demand therefore on your part the fulfilment of the contract; pay me the sum I stipulated to receive.”

Such are the advantages which seem naturally to arise from the plan I have ventured to propose; but perhaps difficulties may occur in the execution, which I, in my zeal, may have overlooked, or which cannot at present be foreseen; and which may render the scheme in some measure abortive. These difficulties,

culties, so far as they appeared, it was my intention to have pointed out in this place, together with such regulations as seemed to me, from a considerable attention to this pleasing subject, most likely to obviate them; but I could not render them so perfect as to satisfy my own mind, in time for the present publication, which I was unwilling any longer to delay, from an apprehension that a bill would be brought into the House of Commons by Mr. Gilbert soon after the Christmas recess, which appeared to me less adequate to the end proposed. There is a principle in the human mind, which renders it impatient of controul; mankind in general may be induced almost to any thing; but he who attempts to compel them, will find it an Herculean labour.

By strict discipline and the terrors of martial law, a body of men may be kept in a state of mechanical subjection; but if the commanding officer does not convince them that he has their interest at heart, and that he harrasses them no more than the service necessarily requires, these men will desert him at his utmost need. To secure their obedience, he must gain their affection; persuade them they are of consequence, and they become enthusiasts in your cause; in like manner convince the multitude that they can and ought to provide for themselves, and *they will provide for themselves.*

I shall

I shall not lose sight of this pleasing subject,\* but if the foregoing outline meets the public approbation, or seems likely to be adopted by the legislature, I shall in due time throw out such hints as appear to me likely to render it successful; together with some observations (as a consequence of the former) on a probable mode of paying off fifty millions of the national debt, in the course of twenty years, without levying any tax which can be felt as a fresh burthen by the people.

\* Since writing the above I have read some Inquiries concerning the Poor, made with equal judgment and humanity by John M'Farlan, D. D. of Edinburgh; which are well worthy the attention of the publick.

So far this ingenious and valuable author.

The picture he has drawn of the resources to be found by a provident management of the poor, is pleasing in a high degree. His remarks on human nature, in connexion with his facts, are solid and judicious. His scheme for a general contribution monthly, in aid of such a fund as he contends for, has the most flattering appearance of success. Happy would it be for this country, were it voluntarily reduced to trial, in every town or district, where the experiment is most easy; from such experiments  
more

more real knowledge would be gained, more general certainty would be established, than from a thousand theoretical speculations.

Nothing is more easy than for a few trials to be made in small manufacturing towns, and in country districts where agriculture is the chief employment of the poor. This at least must be allowed to be true, as to the mode of proceeding, the general earnings of the poor coming weekly through the hands of the gentlemen, tradesmen, and farmers, near whom they live. But a serious doubt has arisen, whether farmers servants be not worse paid for labour than any other, and consequently least capable of sparing a small weekly contribution? If this be the case, it is a subject of much regret, seeing that of all descriptions of labourers these are the most useful and essential. This subject is worthy of general consideration; and a general agreement in most counties, to increase the pay of labourers in husbandry, seems indeed, from the common sense of the publick, to be necessary. It may be a difficulty to fix the point at which a provident poor man might be unable to spare three-pence per week out of his income, without oppressing himself or some of his family; but undoubtedly, in the common course of nature's wants

wants, there is such a point ; to prevent, however, the knowledge of it, is both more wise and more virtuous, than to wish to have it ascertained ! Give him the *power* of contribution, and then the use of it may be fairly expected. By a cordial agreement of masters to point out the advantages of such a plan, and to employ in preference those labourers who should consent to it, consent must become general. From the readiness which the poor in some places have shewn to incorporate themselves, and the idea they easily admit, that to provide against adversity is advantageous and honourable, we would hope there would seldom be found a murmuring disposition. And if their masters and the principal inhabitants were generally, by way of encouragement, to contribute in common with them, the plan would become highly popular and pleasing.

Should it be objected against such a plan, that it would go to the making of the fund too large, which might occasion relaxation among the poor contributors ; it is answered, 1st. Let the wealthy contribute only so far as always to keep the fund up to a certain sum, proportioned to the number of contributing labourers ; or, 2dly ; Let the wealthy contribute at pleasure, and let the amount, over  
and

and above the assumed standard of proportion be constantly divided once or twice a year among the poor contributors, according to their number of children.

Either rule might be adopted, as most suitable to the circumstances of the parish or district ; but the latter may be found the most useful, as being most liberal in its principle, and as tending to strengthen the affection of the poor to their benefactors, which is the surest bond of good faith in society.

*Lastly*; Such a concurring measure would bid fair to secure, almost beyond a possibility of miscarriage, the original purpose of funding; the plan being thus rendered doubly encouraging to the poor, that ease and energy of mind, which make perseverance a pleasure, may be expected to remain undiminished:—for an individual to flag, would be to expose himself to the reproach of all around him.

The constant recollection that the fund is augmenting by the contribution of those not likely to diminish it; or if not constantly augmenting, at least attentively aided by such persons; would fill most of the poor with *gratitude*, which on the present plan

of intercourse is not deemed a very common virtue among them. But this animated affection, once excited, will be kept alive without difficulty, by the continued benefits found to result from the connexion between themselves and their benevolent superiors. Under such a patronage the most worthy among the poor would become improved into still better examples to the less worthy. Emulation, then, insensibly slides into the bosom of the slothful, and of consequence their most obnoxious habits become gradually corrected. All the laborious part of a district, on such a plan, would be animated to strive as in one common cause, feeling one common interest, looking to one common security! The small deduction of three-pence per week would be compensated by the triumph that the idea of *a fund of their own* would inspire. Their children would naturally catch something of the sensation, and be more prompt and alert in their little exertions. The principle of independence, so congenial to the human mind, thus fostered, would grow with their growth, and strengthen with their strength. The moral effect of this principle, rightly cherished, is a wonderful improvement of the mind itself, and would be found not only the most powerful stimulus to industry abroad, but to the best œconomy of the family at home. From  
a general

a general course of provident attentions, a growing *dislike* to the opposite habits, such as, the frequenting of wakes, and other periodical assemblies for idle purposes, may be expected, till a uniform regularity of meritorious, and virtuous conduct might be found, where idleness, vice, and misery, had formerly dwelt.

Where a habit of tippling at the ale-house prevails in the father of a poor family, it is of small consequence to the comfort of that family how much or how little he earns, or whether the articles of subsistence be dear or cheap; wretchedness must attend his family. All that such a man will earn, or filch, is easily consumed by himself, and consumed under a grovelling and stupid notion that to endeavour to save any thing is vain; or if attainable, that there is a greater good in the waste or indulgence of the present moment.

It may indeed possibly be objected, that malt liquor is the natural beverage of this country, and that by a rigid discouragement of drinking strong beer, the consumption of barley would be lessened, and the landed interest thereby suffer. It shall be readily granted that malt liquor *is* the national beverage, and that a check to the growth of barley is



not to be hastily hazarded; but such an evil, if it be one, may possibly be guarded against in a considerable degree, by attempting an alteration in the mode of consumption,

The state of *malting* and *brewery*, under this speculation, comes naturally into consideration. It is now the policy of the legislature to lay so heavy a duty on malt,\* as wholly to exclude from poor, and almost from middling families, in towns especially, the ancient practice of brewing for themselves. Thus it comes to pass that, comparatively, few private families or even publicans brew. I will not say that in the article of strong beer, especially now porter is so generally brewed out of London, the publick is under any material disadvantage from the parliamentary system. Certain it is that a substantial common brewer of strong beer and porter, on a large scale of business, can now brew cheaper and better than a small one. And considering the high duties on the staple articles of brewery, it is rather a matter of surprize that beers of the various degrees of strength, should be rendered on the whole so good as they really are, at the prices they are sold for.

\* Since this was written three-pence per bushel has been taken off; but the reduction is so small, that little alteration will arise in the line of consumption.

But it is worthy of consideration whether an equal consumption of malt may not be obtained by a different use of breweries from that which prevails at present, and the nation, including the bulk of the poor, for whose advantage we are now concerned, be better, that is more generally and usefully, supplied with malt liquor. On the present system, in country towns and districts especially, the alternative is nearly this: strong beer, or no beer at all; for any thing below the description of strong beer is with difficulty to be procured. Hence water, for a common beverage, is frequently drunk in poor families, where strong beer, on account of the man's irregularities, cannot be afforded. And perhaps a hankering prevails in him after strong beer, beyond what might be the case if a supply of fresh and palatable smaller beer could be readily obtained. This hankering after a favourite liquor is augmented by the difficulty of procuring it in common. And when a poor man once breaks out of his business, and gets to the alehouse, he is frequently stimulated with a desire of an immoderate quantity, incurs an expence equal to what might supply his whole family with good table beer, loses his time in drunkenness, (which loss of time is also a publick loss to the community) injures his health and morals, and prevents the possibility of harmony

in his family. The landed interest, then, in this part of the consumption of barley, and that of the revenue in the consumption of malt, are so far forth supported by *irregularity, misery,* and a waste against the wall.

To obviate these objections, and serious evils to the poor, (which are also connected with evils to manufactures, and consequently to the national interest) would it not be sound policy to encourage the setting up of small-beer breweries in country places and manufacturing towns? As an article of large profit, the brewing of small beer for sale in such towns and places, may not be held out as greatly inviting; nor is it perhaps of consequence, or at all desirable, that it should. In a national and moral point of view, it may be quite as desirable that ten or twenty members of the community should get a decent subsistence upon an equality of trade, as that one should acquire a large fortune, while many others shall be his labourers in the manufacturing of an article. And yet in large towns, and for the supply of large towns, with a liquor of all others most pleasant and useful to Englishmen who can afford to drink it, large and skilful brewers of strong beer will always be encouraged, and it is desirable they should be. Neither  
do

do I conceive it would be an evil if such men were a little to raise the price of strong beer, I mean only the finer pale beer of this country, and give the consumer an equivalent in age, strength, and studied excellence of flavour; which might tend to check the now immoderate use of a foreign, and frequently spurious noxious article, under the name of red-port. The consumption of this article of late years, and perhaps we may also say the more unwholesome article of French brandy, is a national disadvantage, as well as a moral one. For they are articles which are against a favourable balance of trade, and induce luxury and disease.

But though, as was hinted before, the *profit* of merely small-beer breweries, especially on that contracted scale which some situations will require, may not be inviting, yet it should be remembered that as things are great or small by comparison, a profit which to large brewers would be unworthy of notice, might be useful and sufficient to another man of small property, small views, and in the habits of manual labour. And it is presumable that by a little encouragement many would be found ready to embark on such a scale of brewery, merely for a scanty livelihood, or to employ a part of their time; the experiment is easy, and may be worth the trial.

It

It may be objected that a man in narrow circumstances cannot purchase casks, and the necessary apparatus for felling beer in barrels, or half or quarter barrels, more especially as the expence of delivery would be a serious one, and the risque of not being paid more serious still. But if only one person in a small compact village, whose house should be favourable to the undertaking, or two or more in a large and extensive parish, were once established, with a small stock of casks, and to sell the beer to those who should fetch it by the quart or gallon, it seems probable that such a plan would be found very convenient to the poor, who might be furnished just as they may happen to want, and in a manner the most compatible with their circumstances. A poor family, which, without such a plan, could not consistently with their income have any beer at all, might on this lay out from one penny to six-pence without trouble or loss of time; and having this beverage would be less likely to make a common beverage of *tea*, which, with the expence of refined sugar and butter, is enough to impoverish the parents, as well as to enervate their offspring. But such an establishment of breweries, if useful at all, as it is presumed they would be, must succeed best under the advice and encouragement of principal men in a parish, who will be the best

best judges of the qualification, proper disposition, and situations, of those who should be induced to engage. It may not always be necessary, and certainly would not, for those who embark to spend their *whole time* in such an undertaking; much other useful business may be done, when brewing is suspended, while a single individual of the family might draw and serve out the beer to the persons who fetch it. Such a plan, in large towns where common breweries are already established, seems to be superseded, by the selling of this article at chandlers' shops; but the abundant convenience and great advantage of that supply, without the necessity of going to the alehouse, is a strong recommendation for an attempt to be made in a more extensive manner.

W. M.

It may be pleasing to some gentlemen, to read any additional, and recent sentiments of so ingenious a writer as Mr. Pew, on his favourite subject; his letter, therefore, respecting the insertion of his pamphlet, is subjoined.

TO THE SECRETARY.

DEAR SIR,

I am much obliged to you for your polite letter, of the 24th instant, which I just now received,  
and

and feel myself highly honoured by the approbation which the Bath and West of England Agricultural Society are pleased to express of my small pamphlet respecting *a better mode of providing for the Poor*, published in 1783; and if my feeble efforts can be of any avail, in seconding the endeavours of so respectable a Society, to bring about a more equal distribution of the bounties of Providence among *all* the sons of men; I can assure you, that as it has been always an object indeed very near my heart, it will give me the most unfeigned satisfaction.

In that pamphlet I endeavoured to give, in the most *condensed* form, the principal advantages, both positive and negative, which might reasonably be expected from such a regulation; and now, after the lapse of eight years, I cannot call to mind any additional arguments which are likely to convince those whose understandings the former statement did not reach. If the Society do me the honour, therefore, (which I much wish) to insert my paper in their next volume, I should wish only to correct the few errors of the press as marked in the copy herewith sent, and to add the two notes, which by some mistake of the printer, were formerly omitted; for as to entering on the practical part, or framing a bill by which the plan might be carried into execution,

it

it seems to me, upon reflection, not only to be highly presumptuous in any individual, but might perhaps be considered as a direct insult to the legislative wisdom of this country, without whose assistance, I am clearly of opinion, no *permanent* or *very essential* advantages can accrue from it; but when I say this, I mean only to express my own private opinion; for no one will be more happy to see such additional arguments as may have suggested themselves to any gentlemen of the Society.

Two difficulties seem to have occurred to several gentlemen, who I am sure are my friends, and well-wishers to mankind; the first, as to the practicability of the scheme; the second, as to its legality. In answer to the first, I can only say, that if government would furnish me with the necessary powers, I would forfeit my life, or carry it generally into execution; and with regard to the second, I confess I can see nothing more illegal or oppressive in taxing a man for the future contingent support of *himself* and *his family*, than in taxing him directly for the support of *others*.

I am, dear Sir, your's, &c.

R. PEW.

Shafton, Dec. 29, 1791.

•P. S. With



*P. S.* With the pamphlet I will send a copy of Dean Tucker's letter to Dr. Stonhouse, on perusing my plan; not out of ostentation, but to shew how much that respectable politician coincides in opinion with the gentlemen of the Society and myself.

*" Gloucester, Feb. 11, 1783.*

" DEAR SIR,

" I thank you for the perusal of Mr. Pew's pamphlet; it is a well written, sensible performance; and if he can extend the scheme of frugal and provident clubs, so as to comprehend the whole, or even a considerable part of our national poor, he will, in my esteem, deserve more of his country and of mankind, than all the Marlboroughs, or Chatham's, or Rodneys, that ever lived. I remember to have had a good deal of talk with the late Sir Onesiphorus Paul, on this very subject. Sir Onesiphorus encouraged these clubs as much as he could, and continued, I believe, a member of several of them till his dying day, in order to countenance them, and set a good example. But in conversation, we then concluded that they must be voluntary associations, and not compulsory assemblies; that they were most practicable in manufacturing districts, far remote from the vortex of electioneering boroughs, (which

(which is the case of Stroud in Gloucestershire) and that they might be introduced to good purpose into towns of 5 or 600 houses, but could hardly suit with those of 5 or 6000.

“ The affair of granting certificates to the members of any of these clubs, to remove to other places if they chose to go, (a liberty that ought never to be denied them) is at present another difficulty, which I wish to see well removed, and the law altered which enables a churchwarden, a constable, or an overseer, to prevent a person of another parish from settling among them.

“ Therefore, with my best wishes of success to the author’s laudable endeavours,

“ I remain, dear Sir,

“ most sincerely yours,

“ J. TUCKER.”

“ To the  
“ Rev. Dr. Stonhouse, M. D.  
“ Bristol.”

## ARTICLE XXV.

*A Plan for the better Maintenance and Regulation of  
the Parochial Poor.*

“ The number of indigent persons\*being greatly increased, by  
 “ withdrawing the alms of the monasteries, a plan was formed  
 “ in the reign of Queen Elizabeth, more humane and benefi-  
 “ cial than even feeding and clothing of millions; by affording  
 “ them the means (with proper industry) to feed and to clothe  
 “ themselves. And the farther any subsequent plans for main-  
 “ taining the poor have departed from this institution, the  
 “ more impracticable and even pernicious their visionary at-  
 “ tempts have proved.” *Blackstone's Com. iv. 432.*

TO THE SECRETARY.

SIR,

**L**OOKING over the list of premiums of your respectable Society, I observe one is directed for the improvement of the Poor Laws. This has put me on recollecting some circumstances, which, in the course of near twenty-five years practice as a justice of the peace in the county of Hants, have occurred to me as likely to conduce much to the comfort of the poor, by making them more industrious than they are found to be at present; and also to introduce a laudable emulation and spirit of good order among that useful part of the community. The propositions are but few in number, but seem to me to be effectual to the point in view. The proposal is as follows:

1<sup>st</sup>. That

1<sup>st</sup>. That in a bill to be brought into parliament, clauses may be inserted to authorize the justices of the peace to order a bounty on work, in certain cases, with a view to producing better effects than by giving money to the poor.

1<sup>st</sup>. *This has been put in practice (by recommendation) for near fifteen or sixteen years past; and has been found to produce an excellent effect. So that three shillings per week dispensed by the overseers, but thought insufficient for the support of a family, consisting of six people, have, by a different mode of disposal, in the way of bounty, produced the comfortable income of nine shillings per week for the support of the same family. But later experience, introduced by the advice of a manufacturer, has abundantly evinced, the greater benefit of proportioning the proposed bounty to each shilling earned, as the latter methods apply to the quality of work as well as the quantity. The former to quantity only.\**

2<sup>dly</sup>. That certificates given agreeably to the Act of the 8th and 9th of King William the Third, and other subsequent acts, for the amendment of the

\* *Illustration.* A. and B. are set to spinning, and are promised a bounty on their work, in the proportion of sixpence bounty to each shilling earned. A. draws her work to a fineness of 15. 6d. per pound, and B. only to 15. A. of course is entitled to nine-pence, while B. deserves only six pence.

same, be hereafter limited to short terms of years.  
See Gilbert's plan, 1781.

2dly. *The use of this is so very obvious, and promising of improvement, that it is supposed eight or ten certificates will be granted under the limitation, instead of one in the present mode. And thereby the number of industrious people in the nation will be much increased. As it is found on observation, that the certificated labourers are abundantly more active and industrious than the settled inhabitants. And, further, that if such certificate be granted for a year only, the justices of the division may enforce the granting it.*

8th and 9th } 3dly. That a discriminate and special use of the badge be applied by William III. } the overseers, with the consent of the  
Cap. 30. } majority of a vestry, (subject to appeal to the division or district justices, at their petty sessions) as a censure and punishment to the disorderly and lazy poor only.

3dly. *It is supposed that a creditable mark or token of distinction might also be added with excellent effect. As a reward, for instance, to an industrious labourer, or an ingenious artist, who has bred up a numerous or considerable family in a reputable manner, without assistance*

*assistance from the parish in which he is settled. Some real benefit may also be added thereto—such as, an exemption from highway duty for a certain time, or for ever, as in the case of militia-men enrolled in their own right, and not as substitutes. Other useful services to a neighbourhood may likewise be rewarded in the same manner; as for instance, to those who prosecute or make discovery of persons guilty of misdemeanours, and the several degrees of larcenies and felonious offences.*

These observations are submitted to the consideration of the publick, as constituting an expedient for the better management and regulation of the poor of this kingdom. And it is presumed that, by these means, the general body of the poor may be supported in the proportion of half the expence which has been incurred, on their account, for any given period of time within the last seven years; that better order and regularity will be established and kept up among them; the national stock of industry increased; that the plan is easy, simple, and speedy in its execution; and lastly, that the largest county in the kingdom will not require *one hundred pounds* to carry the plan into practice, as the meanest cottage will, by the bounty proposed, become a work-house for one family, so long as it will be wanted: a circumstance, it is imagined, of no ordinary consequence,

sequence, at a season when the kingdom has been put to large and heavy expences on account of improving gaols and publick prisons.

This, Sir, is the result of my observation; and, I trust and believe, it contains hints that would be found effectual to the intended purpose. If it should meet with the approbation of the committee, I own I shall think myself honoured by their good opinion; but if it shall only be the means of urging some more experienced person to propose a better plan, the community will receive the greater benefit, and I shall be a partaker of the general good, as an individual.

I am, Sir, your most humble servant,

THOMAS HALL.

*Preston-Candover near Odiham,*

*Hants, May 12, 1792.*

*P. S.* It is supposed that this plan will operate peculiarly in manufacturing towns; where there are aged or sinking manufacturers; and will enable a master to reward merit, or support the distress of an individual labourer, without danger of advancing the general price of labour.

## ARTICLE XXVI.

*On the Damage of Fir-Plantations; in reply to the enquiry instituted by this Society, as before alluded to by Mr. Davis of Longleat.*

TO THE SECRETARY.

SIR,

UPON reading over the minutes of the last general meeting of the Bath Agriculture Society, as advertised by you the 14th June last, I observed that the society had received information from Mr. Horner, that his fir-plantations at Mells park have of late years suffered in a very alarming manner by squirrels preying upon the bark, whereby great numbers of his finest trees have been killed, and a general destruction threatened; and that the society, wished to institute an enquiry how far other gentlemen's woods have suffered from the same cause, and would be obliged by any communications on the subject.

Happy in complying with the wishes of my brother members of the society, I take up my pen to inform them, that I have been a fellow-sufferer with Mr. Horner, for near these dozen years last past, in my fir-plantations at this place, from the same destructive animals.

S 2

Many



Many years ago, thinking the squirrels very harmless creatures, and liking to see them spring from tree to tree, I gave orders that none of them should be destroyed; by which means they increased exceedingly. I found no inconvenience ensue, till about 10 or 12 years ago; when, after a long and severe winter, I took notice one day, in going round my walks in the wood about the beginning of April, that several of my young Scotch firs, which had then been planted about 15 or 16 years, and were very thriving trees, were stripped of their bark in several places, and the strips of the bark five or six inches long, lying at the feet of the trees. I at first thought that some roguish boys had been playing tricks, but upon further examination I found the trees in many places were stripped so high up, that no boys could possibly have got at them: at last, after watching several times in order to find out what could damage the trees in this manner, I caught the squirrels in the fact of stripping and tearing off the bark, and throwing it upon the ground. I never perceived any of my trees thus injured before; but since they have begun, they have never failed more or less to attack my fir-trees every year both small and great. Of one whole plantation of Scotch firs, of about 2500, which I planted out in the year 1766, there is scarcely a tree has escaped their ravages.

Wherever

Wherever they bark the tree all round, there is a discontinuance of a due circulation of the sap, and that part of the tree, which is above the injury sustained, dies, and is generally broken off by the first high winds in the ensuing winter; and the trees, deprived of their tops, make a most unsightly appearance and are spoiled. Besides these younger trees that are thus barked, I have many large trees, of at least 50 years growth, which are in like manner damaged, by these mischievous animals, in their upper branches and leading shoots.

I have particularly observed that these animals attack no other species of the fir or pine kind but the Scotch fir, notwithstanding the Scotch fir has the roughest and hardest bark of any. The spruce, the silver, the Weymouth, the larch, the pinaster, and the cedar of Lebanon, though intermixed occasionally with the Scotch in my woods, remain unattacked and unmolested by them. I have observed too that the squirrels never begin their attacks till about the beginning of April, and generally cease from their destructive works about the latter end of May.

From this circumstance I have been induced to draw this inference; that these animals, which are

known to lay up in the autumn their hoards of nuts, chefnuts, beech mafts, acorns, &c. for their winter confumption, never attack the firs while they can get ripe fruits in the funmer, or while their hoards remain unconfumed in the winter; but that as foon as their winter ftore are exhausted, which will fometimes happen in long and hard winters followed by a late fpring, (as was the cafe when they firft attacked my fir-trees 10 or 12 years ago) they are driven by neceffity to feek for food wherever they can find it. This neceffity probably firft prompted them to try what the Scotch fir might produce; and having once tafted the refinous particles, they relifhed it fo well, that they have ever fince reforted to the fame fource of fupply whenever the calls of hunger urged them to it. What further perhaps induces thefe animals to apply to the Scotch fir in preference to the other forts of firs, may be the fimilarity of tafte between the feeds of the Scotch fir cones, (of which the fquirrels are remarkably fond) and the refinous particles which lie beneath the inner rind of the Scotch fir; for it is, I apprehend, thefe refinous particles which they eat, and are in fearch of when they ftrip off the bark, and not the bark itfelf, which they always reject and throw down. After mild winters their ravages are not fo great, their hoards not being fo foon exhausted; to this reafon I impute it that  
my

my trees have escaped this spring (after so mild a winter as the last) without suffering much damage. Having thus pointed out the mischief, and in some measure accounted for the cause of it, I wish I could as easily point out the remedy.

The destruction of the animal of course is the first that offers itself; but that is not, in large woods especially, so easily accomplished. There are various ways, by which their numbers may be diminished, but in the shelter and harbour of extensive plantations, their agility and their cautious shyness and cunning, will baffle all our endeavours; however, they may be greatly lessened by degrees, and in time perhaps in a great measure extirpated, either by taking their nests and destroying their young year after year, when they can be got at, which is not always to be done, as they generally build their nests at the extremities of the branches; or by hunting or shooting them. But where they are numerous, all these methods will hardly be sufficient, unless pursued by an unremitting perseverance. If any more effectual method can be thought of for destroying these animals, I shall be very glad to be made acquainted with it.

Thus I have committed to paper such particulars as have occurred to my observation relative to these destructive

destructive creatures; which I must beg you will lay before the society at their next meeting, with my most respectful compliments.

I am, Sir,

Your most humble servant,

JAMES BERNARD.

*Crowcombe-Court, July 6th, 1791.*

# ARTICLE XXVII.

*On the subject of the foregoing Article, Planting, &c.*

*Salisbury, Oct. 6th, 1791.*

SIR,

I Have taken every opportunity of enquiring into the matters stated in your letter of the 30th of July. Some injury, as I have been informed, was done by squirrels to the fir plantations of Lord Arundell, of Wardour, as much as ten or twelve years ago. The plantations of the Earl of Ailesbury, at Tottenham-park, have also been attacked in like manner. The damage complained of is, however, I believe, far from being general; nor have I heard of it in so great a degree as that which you mention.

Very

Very few plantations, except small ornamental ones, have been made in this neighbourhood.

The raising of oak timber for future navies was, I know, considered as an object of great national importance by John Pitt, esq; late surveyor-general of the King's woods and forests; who directed his attention to planting part of those unprofitable lands. Near twenty years ago he selected two thousand acres for planting in different parts of the Forest of Dean, and one thousand acres in the New Forest. The land was inclosed for that purpose at a very considerable expence. Since receiving your letter I have seen part of those plantations in the New Forest, and have been well informed respecting the remainder. I am truly sorry to add, that they appear to have been neglected, exposed to damage, and are now in a deplorable state.

The growth of timber in general, and oak timber in particular, is, I fear, much on the decline. Rough uncultivated land is the natural nursery of a young oak; but every soil is not well adapted to its growth. When suitable land is farmed out, an industrious tenant will probably clear, and bring it into cultivation. If left in its uncultivated state, cattle are turned in, and destroy the young plants. It has  
generally

generally been held that an oak does not remove well. The surveyor-general before mentioned, who paid great attention to his own plantations, informed me that by removing an oak twice or thrice, when very young, and each time cutting off the tap or principal root, it would afterwards prosper as well as any other tree.

It seldom happens that timber is raised on farms let out to tenants to cultivate, except particular attention be paid to it by the landlord or his steward. It is not merely the giving orders for a number of trees to be planted that I mean. The man who succeeds must plant that which is suitable to the soil, preserve it from damage, and take pleasure in seeing it flourish. There are few sorts of timber proper for hedge-rows. Perhaps elm generally succeeds the best, and does the least damage to quick fences. When a hedge is new plashed, the labourer cuts off many young saplings, which would, if let stand, make timber. It is good policy to give these men a small gratuity for every dozen of saplings that they spare. This is actually practised on the estate of the Marquis of Bath, through the good conduct of his steward, one of our worthy and very intelligent members. After trees are planted, or led up in this manner, it requires particular attention to preserve them. They  
are

are sometimes destroyed by cattle biting off the young shoots, or rubbing against them; and are frequently spoiled for timber by being lopped, shrouded, or headed, by the farmer or his servants. The timber which is raised belongs to the landlord, nor is it the interest of the tenant to encourage its growth. The dropping of trees frequently destroys his quick fences, and their shade considerably injures his land. When a tree is converted to a pollard, by taking off the head, or mutilated by lopping or shrouding, it does less injury, and the farmer has generally the privilege of taking the lops and shrouds for his own use. A strict attention, with proper covenants in the lease, may prevent these abuses. On the contrary, tenants who carefully nurse up young timber should be encouraged by rewards, or allowances; or by occasionally assigning them timber for their use.

As the raising of timber on farms requires more attention than it generally receives, and the royal forests have, I fear, been too much neglected, it is to noblemen and gentlemen who hold large tracts of wood-land in demesne that posterity must be indebted for this most valuable article. In the management of this sort of property there are, however, two extremes which ought to be avoided. The first



is that of leaving no saplings, when the coppice or underwood is cut; or, if left, shamefully cutting them down with the next fall of underwood, on the same ground, which in some places is a common practice. The other extreme is that of leaving too many saplings, and not thinning them in proper time. It is of great consequence that young trees should be *gradually* thinned out, as they increase in size; taking away the small, stunted, or unkindly trees, and letting the largest and most flourishing remain. This operation should commence time enough to let the branches spread into a good head. When trees stand thick together, they run up like poles; the branches perish whilst young, and it is then too late to begin thinning: such trees never make timber. Whatever be the age or size of trees, in a coppice, the distances should be such as to admit of a free circulation of air between the extreme parts of the branches. Even in hedge-rows, where they have the full benefit of the air on two sides, trees scarcely ever flourish when they stand thick together.

There are very few estates where some spots of land may not be found that will answer better for planting than for any other purpose. If the owner of such land be not in immediate want of its annual produce, he cannot lay out his money more beneficially

cially for his family than by planting it with trees suitable to the soil. Should the estate be disposed of, the young timber will, on a valuation, generally be found to pay great interest for the money so employed.

The London society has meritoriously held out honorary rewards to those who distinguish themselves by planting. Noblemen and gentlemen would do well to follow so good an example, by encouraging farmers and workmen who plant, nurse up, and preserve young trees; remembering that it is not planting alone, but care and management, that must ensure success; and thereby prevent that national scarcity, which might prove a serious evil to posterity.

I am, Sir,

Your obedient humble servant,

BENJAMIN PRYCE.

To Mr. Wm. Matthews, Secretary.



## ARTICLE XXVIII.

*The same Subject continued.*

TO THE SECRETARY.

SIR,

**I**T has been observed that\* fir-trees in Lord Ailesbury's plantations, particularly Scotch firs, have been barked in the manner described in your circular letter; generally at the bottom of the leader of each branch; the ground under some of the trees has been covered with the woody parts that have been chewed, in such quantities, that a peck or more might be collected under one tree. This mischief has been found to be more frequent, in seasons when there has been a large breed of squirrels, and at a time when it may be supposed their autumnal collections have been exhausted; and about four years ago, when squirrels were uncommonly numerous about Tottenham-park, upwards of fifty trees, called Hornbeam, were barked in the trunks and branches a considerable way down, which occasioned most of them to die. The injury we at first supposed to have been done by a racoon, which escaped from a gentleman's house in the neighbourhood, and went towards Tottenham-park; but I do not find there was any good ground for believing so much execution could have been done by one animal.

This

This mischief, however, in Lord Ailesbury's neighbourhood, has been inconsiderable, in comparison with that done to the plantations of the gentleman alluded to by your letter. Plantations here have suffered much more material injury, by not having been properly thinned on growing up. Gentlemen, whose disposition leads them to make plantations, have seldom resolution enough to make use of the ax as they enlarge, and the consequence is, that the trees run each other up into striplings, and seldom if ever make fine timber; yet it is necessary they should at first be planted pretty thick, especially in exposed situations for shelter; and if horse chesnut, Scotch fir, sycamore, and other fast-growing trees of small value as timber, are planted with better kinds of trees, they will pay well to be thinned out, and furnish no temptation to the owner to keep them growing too long.

I am sorry to say, that except on some parts of the estate of Lord Ailesbury, who for the last thirty or forty years has paid unremitting attention to this important article, the state of oak and other timber in this neighbourhood is not to be boasted of; and even on his manors, it is sometimes a difficult matter to prevent the lopping and pollarding timber-trees, particularly of ash, which will burn while green.

The

The raising of young timber on estates has not been sufficiently attended to. Land-owners knowing they have little chance of living to cut down and fell the tree they are at the expence of planting, do not often consider, that their estate is notwithstanding increased in value and improved in beauty by being well planted, and consequently would at any time sell for abundantly more than would repay them the first expence of planting with interest. But tenants for life or years have no great inducement to improvements of this sort; on the contrary, they would incumber their lands without any profit; and this generally occasions them to be as backward in raising timber, as they are industrious in pollarding what does get up.

Lord Ailesbury has introduced a covenant in his leases, whereby his tenants engage to plant and preserve a certain number of trees yearly, in proportion to the size of their estates; but even this is not fully complied with, and he has lately employed a person to go over his farms, to seek out the fittest places in hedge-rows, &c. for planting, and afterwards sent plants from his own nurseries, and had them planted. The same person marks for reserves any self-planted trees he can find in the coppices and hedge-rows that come in course for cutting, to save them from being cut down with the underwood.

The

The soil in this part of the country has not in general sufficient depth to produce fine oak timber; where it does grow well, as in Savernake-forest, it seems peculiarly well adapted for knee-timber; but from the want of water-carriage, and of a purchaser at hand, many a valuable lot of good knee-timber is used for the most inferior purposes of repairs, gate-posts, &c.

As I have no knowledge in naval affairs, I can form no judgment in what respect Spanish-chestnut, elm, or larch, may be substituted to advantage for oak. Spanish chestnut, I have understood to be nearly as good as oak; but it is not a much faster growing tree, except while young; I believe it requires nearly as good a soil, and it does not do well except in sheltered situations, and is apt to shoot out in several stems from the bottom; which must retard and weaken the growth of the plant, 'till one leader overpowers and destroys the other shoots. In Lord Ailesbury's plantations the Spanish chestnut has run up with other trees, and makes a pretty respectable appearance; but where it grows single it is generally stunted. There are several of these trees in Brimflade-lawn, near Burbage, the largest of which measures 13 feet 2 inches round the stem, at four feet from the ground, and yet the top makes

but a mean appearance for so large a trunk. I suppose our climate is too cold for this kind of timber, which the above circumstances, as well as that of the fruit seldom or never ripening, seem to evince.

Elm, where the soil is suited to it, is a very profitable tree; it does best in sandy land; may be planted in hedge-rows with less injury to the quick-hedge than any other tree; and when once planted, the succession may without trouble, and with very little care, be continued for ever, by suffering the shoots that rise spontaneously from the roots to grow up; and this tree has not the property of burning green—it is however the almost universal practice of farmers to strip off its branches, which not only extremely disfigures, but greatly injures it, and should not be suffered.

As to larch, from every observation I have made and heard, it seems clear, that it is one of the most profitable trees that grows. In Lord Ailesbury's plantations, where it has been raised with other firs, almost every larch may be seen above the rest of the trees. It grows well, even upon thin, gravelly, or heathy land. The stem is straight and clean, and the deal it cuts into is nearly, if not quite, as good as foreign. This tree, except in gentlemen's  
pleasure-

pleasure-grounds, has been very little cultivated in our neighbourhood. I hope, however, that those Lord Ailesbury has planted, and intends planting, will attract the notice and attention of his neighbours, and occasion their more general cultivation. He has appropriated *two hundred and forty-three acres* of new included land, near Great-Bedwin, called Wilton-Brails, which is now staked out, and is intended to be planted the ensuing winter with all kinds of timber, particularly larch, oak, and Spanish chestnut. The land is peculiarly well adapted to the growth of timber, and I doubt not will in time, with his other improvements in the planting way, become a most valuable addition to the property of his Lordship's successors, an ornament to the neighbourhood, and a publick benefit to the country.

I am, Sir,

Your most obedient servant,

JOHN WARD.

*Marlborough, Oct. 10, 1791.*

*P. S.* Lord Ailesbury is pursuing the same system of planting on his Yorkshire estate, where oak timber grows in great perfection.



## ARTICLE XXIX.

*On Shetland or Zetland Sheep and Wool.*

TO THE BATH AGRICULTURE SOCIETY.

GENTLEMEN,

**T**O a Society so eminently distinguished for its laudable exertions, and its beneficial consequences as yours, every address ought to contain something conducive to the good of mankind. If the following come not so recommended, it deserves at least the praise of a good intention.

The subject is the celebrated Zetland Wool, with a scheme the most likely to make it advantageous to this kingdom in general, and a support to that island in particular.

Zetland extends from more than  $59^{\circ}$  to more than  $61^{\circ}$  N. L. and as it lies in an oblique direction is considerably longer than a degree; its breadth is variable, from 6 miles to 20. It is composed of a number of isles intersected by sounds and firths, which are stored with an abundant variety of fish; and the harbours are the best in Europe. The sea is very stormy, especially in winter, when the spray

is carried over a great part of the island, and renders the grass peculiarly good for feeding; this likewise prevents the snow from lying long on the pasture grounds; but entirely mars the growth of trees. It is inhabited by about twenty thousand people, who depend upon the summer fishing, and knitting of stockings, for their scanty and precarious subsistence; the fish is sent to Barcelona, Leghorn, or Hamburgh; and the stockings sold to the Dutch fishermen, or sent to Hamburgh; and the fine stockings to Edinburgh, where they sell from three shillings to one guinea and a half a pair.

The landholders let their lands from year to year, on condition of some personal services, and all their product at a small price in the option of the buyers, who are often tacksmen, and rent the people's services at about 500*l.* for forty or fifty boats with six men each.

The people are said to be indolent; the reason of which is, that the landholders, by a barbarous policy, and by a variety of means, contrive to bring them into debt, to prevent their leaving their country; [N.B. Few of the people can either write or number; for the same policy prevents good schools being kept:] and they, despairing of independence, become hopeless and indolent.

The sheep are small, and distinguished from other sheep by marks unnecessary to relate;—are subject to few diseases; and sell at about 5s. a head. Each sheep has about two pounds of wool, one-fourth of which is very fine; the hatters in Edinburgh have offered four or five shillings per pound for it, but it sells at one shilling per pound.\* The oldest ewes have the finest wool, but the coarsest is thought fine in Scotland. I have heard that the same breed of sheep may be found in Ireland and Herefordshire; but little distinguished by the fineness of their wool.

The number of sheep may be about ninety thousand, but might be *increased* to four times that number; to point out the means of which was the chief design of this essay.

The causes of decrease are many:

1<sup>st</sup>. The landholders subdivide their lands so often for the purpose of getting a number of fishers, [N. B. Six acres is a large farm]—that few tenants are rich enough to purchase sheep, wherefore the master gives them some in steelbow, that is, the tenant keeps them, and the master has the half of all the product; but as he never claims the dead, the tenants, urged by hunger and dispirited by oppression, often find sheep dead by accidents unknown.

\* This seems unaccountable.

2<sup>dly</sup>. The

*2dly.* The master receives part of his rent, and the parson his tithes in lambs; and the people, to prevent a true account, never gather them from the hills, nor tend them, but mark them and let them run. Some are stolen.

*3dly.* Many fall victims to dogs, eagles, and ravens, in spring; and some are smothered or drowned in winter, by almost a total neglect of them by the owners.

*4thly.* As tenants seldom receive money from these monopolizing masters, they are forced to sell their stock privately to purchase necessaries.

*5thly.* From a short-sightedness peculiar to this people, they seldom look beyond the enjoyments of the day. *Cause:* As soon as a farmer is thriving, he gets a warning to remove, and must buy his peace by a sum of money proportioned to his circumstances.

Indeed, premiums have been offered to encourage breeding; but as the landholders distribute these, no share is allotted to the farmers, who alone have the power of giving effect to these designs.

Now

Now the means proposed, I think, would be effectual and profitable to those who should undertake the design.

Let any company of clothiers take a ten or twelve year's lease of as many scattalds (pasture-grounds) as possible, with all the sheep upon them. Let some shepherds be got from Scotland, (I would not trust a Zetlander) who know the management of sheep in snowy hills, and who could be trusted with another's property. Let there be wool-sorters got; and as the Zetlanders are the best spinners in Britain, let the wool be spun, and yarn sent to England, for vest-pieces, &c. &c. By this their numbers would increase, and the overplus would belong to the company; and it would become beneficial to the island in giving employment to the poor, many of whom are now starving for want. Even other branches of trade might be carried on by the same company to their own and the country's mutual advantage;—an account of which I will readily give, if ever it be required.

#### ON THE FINENESS OF WOOL.

For the superior fineness of the Zetland wool, there are many conjectures;—but I am of opinion,  
there

there are many concurring causes, and the most of these local.

The chief is the peculiar breed of sheep.

The next, I humbly conceive, to be the nature of the pasture; which, by its proximity to the sea, is strongly impregnated by salt particles, carried up by the winds; because the grass on head-lands and banks is soft and close, different from the inland or meadow grass and the sheep are fond of it; and because it is known that a daily supply of salt is given to the Spanish sheep at the watering-places; and it is thought to contribute to the fine-

#### WOOL.

And for reasons, their *plucking* the wool, or allowing it to grow close; this may be confirmed by observation; and the oldest ewes have the finest wool.

Another great cause is, their northern situation; for all animals have more hair than in Scotland, as horses, cows, &c. Cats, rabbits, and otters, have finer fur. And however ridiculous it may appear, even swine have *hair* on certain parts of the body.

Now, as all this is probable, an experiment similar to that in Scotland might be made, by fixing  
upon

upon some small isle or peninsula, on the sea-coast of Wales, Devonshire, or Cornwall, where the sheep could be allowed to feed as in Zetland; and by the increase consequent on a proper care, they might multiply to a great number.

Or, as in Spain, some flocks might be fed in the mountains during summer, and in the low-lands in winter; but as this last seems impracticable, I shall only observe, that the temperature which the Spanish sheep enjoy, is thought to be the reason that the hot climate has not the same effect on the sheep there, as it has in every other hot country.

By means of the former experiment, a gradual improvement, if not a new stock, might be introduced.

N. B. Five or six sheep of the Zetland breed may be fed with the food of one English.

An account of the current trade and probable schemes of improvement of Zetland, may be had if necessary.

I am, your's, &c.

J. TOMPSON.

*Burford-School.*

## ARTICLE XXX.

*On Miscellaneous Topics of Husbandry.*

TO THE SECRETARY.

SIR,

**I** Have a pleasure in communicating to the Bath Society every thing that occurs to me in farming, in hopes that part of it may by them be thought of use to the public.

I informed you that I found raw potatoes as nourishing for hogs as boiled; the expence and trouble of boiling would be too much to be followed on a large scale. The great uncertainty of having a good crop of turnips, made me last year plant eight acres with a *plough*, with which I turned them out of the ground in October, and carted them into one end of a barn rather in a wet bad state, as I was in a hurry to sow wheat in the land, and there was no prospect of dry weather. I think I had 60 or 70 tons, which I could have sent to Bristol for about 15s. per ton, and probably have neated about 20s. per ton, if I had sold them; but I preferred trying the experiment of feeding my stock with them, and accordingly I preserved them with once turning till January, and then began to give them with hay to my fat oxen, working oxen, cows, work-  
ing



ing horses, saddle horses, and colts, of all ages, and to my hogs; and they all ate them greedily, and looked much better than usual; so that I think these potatoes will yield me, in the saving of hay and other food, and in the increase of manure, about 20s. per ton, and be always in future a good resource in case of a dry summer, a scarcity of hay, and failure of my turnip crops. But near great cities, where 40s. per ton may be made of them, and manure brought home from thence, the advantage of my practice will be less; and I confess I am disappointed in not being able to get my sheep to eat much of them, which I have endeavoured to force them to do in this way:—I have folded some sheep and lambs in an old garden where there are some laurels, laurustini, box, and yews, but very little poor mossy grass; and there I have for some weeks fed them on mangel-wurzel, roota-baga, or Swedish turnips, cabbages, potatoes, carrots, parsnips, ivy leaves, and a little hay. They prefer each of those things to potatoes, and eat all the evergreen shrubs, except box, which being bitter, they will not taste it; they eat some of the potatoes, and would probably eat more, if they were very hungry, and left a day without other food.

Doctor Anderson must have had wrong feed, or he would not have been prejudiced against mangel-wurzel,

wurzel, which will yield 30 tons an acre (exclusive of the leaves) of good food, which may be housed like potatoes; and wheat sown in the land, which is certainly a great advantage, to avoid the necessity of naked or barren summer fallows.

I had last year about 50 tons an acre of Drumhead cabbages, which will yield great plenty in December, January, and February, and they may be succeeded by mangel-wurzel and potatoes, and these by roota-baga, and turnip-rooted cabbage, which bear frost much better than common turnips.

Sheep are shy of food they are not used to eat, but hunger will bring them to eat most things fit for them. They are remarkably fond of *roota-baga*, which are less spongy and more solid and sweet than the common turnip in April. I have this year kept them very good in the ground till I had a good bite of vetches, clover, and rye-grass; the leaf is smooth like the cabbage tribe, and the sheep are very fond of them.

When I was writing this, I found in your second volume, p. 262, a letter from Mr. Wimpey, recommending the housing of sheep and lambs in winter, to avoid a kind of wind-colic, which kills a great  
number

number of the fattest lambs when the nights begin to be cold and frosty. I have for many years saved my lambs much better than my neighbours, by houseing them, and giving them hay after drenching them with tar, butter and garlick, which makes them lax for a day or two. They have a custom in Lancashire, of rubbing tar and butter on the skins of sheep, which they call salving, to thicken the wool, and preserve them from the scab. I have not heard of this practice in the southern parts of this island.

After writing the above, I received your favour of the 21st, for which I thank you, and shall add a few lines in answer to your queries.

I had my *rotta-baga* from a principal seedsmen in London, very good, and have preserved some for seed, as I shall of those you have been so good as to send me. I like to try every thing new, and therefore wish to have some of the mowing cabbage, mentioned by Sir T. Beever in your last volume. My Carolina grafs all died, and I fear it has no merit.

The farming gentlemen in North and South Wales are so remote from, that they have no intercourse with, each other; nor have those of different counties much; they are mostly divided by hills;  
and

and the soil varies so much, that each county should have a society for promoting agriculture, and other improvements for their local advantages, in which the general good will necessarily be involved. In Breconshire there has been one above 30 years; we followed them, and I have long been surprised that there should be a county in the island without a fund raised by the voluntary subscriptions of the affluent, to promote such objects of public utility as the majority of the subscribers approve; but there is a want of public spirit, so that improvements go on very slowly, though I think much faster in this than any former age.

The vale of this county, bordering on the Bristol channel, far exceeds any other vale in Wales in extent and fertility. We have a very good breed of horses, cattle, and sheep, and are improving; but in the north-side of the county, there are thousands of acres of heathy hills, where all animals are nearly in a state of nature. The people live in very narrow valleys, and are mostly employed in herding their small horses, cattle, and sheep, on the hills; to the breed of which they give no attention, as they pay very little for their pasture. Their great difficulty is to preserve them in winter; they house the cattle, but the sheep are often buried in  
snow

ſnow many days, and I have known one farmer loſe above 500 lambs in one ſpring, and be ſeveral years breeding a freſh ſtock on the ſame hills, as thoſe brought from other hills would not ſtay on his ſheep-walks, and moſt of his neighbours ſuffered by the ſame cauſe and had none to ſpare. Theſe ſheep yield about one pound of wool each, which is made more hairy by being expoſed to rain and ſnow.

I think that ſmall ſheep, ſhort ſweet paſture, and ſhelter from rain and ſnow, are all eſſential to produce very fine wool; but the ſize of the animals muſt ſuit the richneſs of land, to yield the farmer profit, and that muſt ever be his firſt conſideration. Tithe, and the indolence and infidelity of ſervants, will ever be a great diſcouragement to gentlemen in farming, though I believe there never were ſo many gentlemen farmers as at this time; and that moſt of the modern improvements have been made by them. Let the partial and unjuſt law of tithe be aboliſhed, and an equal pound-rate ſubſtituted; and let all owners of eſtates have a power to grant the terre tenant a leaſe for 21 or even 14 years; and let a general incloſing and road bill be paſſed, without ſacrificing the intereſt of the publick to the emolument of the Speaker of the Houſe of Commons, and his officers; and improvements in this iſland  
would

would now go on rapidly, beyond our most sanguine expectations, and instead of encouraging the ruinous practice of gambling, by giving King's plates under a pretence of improving the breed of horses, let the government give a certain sum (in proportion to the amount of the land-tax in each county) upon condition that double or treble that sum be raised by the inhabitants, and applied to improve agriculture, and other objects of public utility there, and it would then stimulate the gentlemen to meet and exert themselves, as it would be a disgrace to lose the publick bounty, through ~~their~~ <sup>their</sup> own indolence and want of patriotism. The national advantages of inclosures, instead of wolds and race-grounds, would then soon be better attended to and understood. There would always be too much land uninclosed on the tops of hills, and sheep will always be too profitable to be neglected, if it were possible to inclose the more level parts of the whole island; so that the objection to inclosing on account of sheep-walks, and also on account of the poor, (who are much more wretched for want of work near commons, than where all the land is inclosed,) is futile and ill-founded, for want of a more general and perfect knowledge of facts.

The arable farmer is a very useful member of society; he employs twenty times as many people as

the grazier, and ten times as many as the dairy-man, on a farm of equal value ; furnishes proportionably more of the necessaries of life ; and often lays out from 5 to 8l. per acre in ploughing, liming, and seeding an acre of wheat ; and as soon as he has cut it the rector\* comes and *sweeps away* one-tenth of his crop, when the remainder is much too little to repay him his expences. Is there any equity, or shadow of justice in this ? Why should this laborious industrious man pay five times, and in some cases ten times as much as his neighbour, for having a sermon preached to him once a week, by an immoral curate, who is often hired by the absent rector for one-eighth or one-tenth of the value of the living ? And what is still more mortifying to the farmer, and derogatory from the original intention is, that ecclesiastical corporations and lay improPRIATORS live in luxury, vice, and folly, on the labour and industry of the poor arable farmer.

To encourage the plough would be a much more effectual way to reduce the price of corn, and enrich the country, than to restrain exportation, and pay a bounty for importing what could be abun-

\* This is confessedly a serious discouragement to agricultural improvements, and calls aloud for a reformation. The rector, in such cases, is not to be blamed ; he has the law on his side, and the farmer cannot expect him to forego his legal right.

dantly supplied from the thousands of acres now lying waste.

I heartily wish the utmost success to your patriotic society, and all other attempts to promote the publick good.

I am, Sir, your's, &c.

J. FRANKLEN.

*Llanmibangle, April 25, 1791.*

ARTICLE XXXI.

*Extract of a letter from a Gentleman in Scotland concerning the RUTA-BAGA.*

“ I Have introduced into this country the Ruta-Baga, or Swedish Turnip, conceiving that it might be of great use as an article of green food after the month of March, when usually our common turnips run all to seed, and we find ourselves at a loss for food until our grass grounds are ready; which they seldom are until the first week of May: hence my experience of this plant is mostly confined to the spring.

“ The first trial I made was in the year 1789; not knowing better, I followed the common method



of sowing the seeds in my garden, upon an hot-bed, some time about the 12th or 15th of April; about the 10th of June I transplanted them into the field, where I had turnips, carrots, and other drilled crops; the quantity of ground planted was exactly half a Scotch acre. It had been ploughed and dunged in the usual manner, the same as the rest of the field, where the turnips were sown and drilled in the same way into three feet ridges. About the beginning of July they were horse-hoed and hand-hoed, and managed exactly the same as the turnips. I forgot to mention the plants were set nine inches separate in the row, and not one of them failed taking

“ In winter I began taking up a few for my table; they seemed in general smaller than our common turnips, and longer, mostly of the figure and size of a quart bottle; but *twice as heavy* as a turnip of the same size. For their use for the table, I can confidently recommend them as of superior flavour, so much so indeed, that after eating them none of my family would taste the other turnips.

“ I tried my cows and my fatting oxen with them, and they ate them as readily as the common turnips. My sheep uniformly refused them as long as they could get other turnips; this I did not wonder

wonder at, as all my sheep are six and seven years old, and their want of teeth makes it difficult for them to eat a root so much harder than turnips.

“ To try how the Ruta-Baga would keep after being taken up, I had a few pulled in November; one half cart-load I put up in sand in a barn, and the rest I laid upon a grass-walk in my garden, to be safe from being eaten up; they lay there entirely exposed to the weather until April, when they were just as good, and the cattle ate them just as well, as if they had been fresh; those in the barn were just the same; also we had them both at our own table, and found them quite as good as those we had eaten in November. This trial abundantly convinces me of their hardiness, as we had in 1789, from the 15th of March thro’ all April, very hard and severe storms of frost and snow with little or no intermission.

“ In 1790, there was no frost. Imagining this a year that the transplanting was troublesome, and that they might grow larger if sown on the place where they were to stand, I caused half an acre to be sown the first week in June, in drills of three feet, and laid out the plants like common turnips; the event answered my expectation; the roots were considerably larger than last year, although sown on

much worse ground. Except what was used for the table, the whole was pulled up the 20th or 25th of March, and laid in heaps in the barn yard, entirely uncovered from the weather, and were given to my fatting oxen after all our common turnips were gone. I think they lasted about three weeks, which was of the greatest advantage to me, for the mildness of the weather caused all our turnips to feed, and having no grass, our cattle were starving.

“ On the whole, I am already of opinion that the Ruta-Baga is a most valuable root ; whether it be used by taking up a quantity previous to a fall of snow, when the other turnips cannot be got at, or by pulling up in spring and laid by, to be used after our common turnips are gone.”

#### ARTICLE XXXII.

*On Butter-Making,—and the Author's Pamphlet  
on Dairying.*

TO THE SECRETARY.

SIR,

**A**BOUT the time I published the second edition of *Dairying Exemplified*, being soon after the death of my good friend Mr. Rack, who was earnest for the success of it, as he thought it had a tendency

tendency to great utility; I wrote a letter, directed to the Secretary of the Bath Agriculture Society, mentioning how desirous Mr. Rack, with whom I had exchanged several letters on the subject, was, for the publishing an edition on dairying alone, (my first having contained a treatise on orchards, and on vegetation) which he thought, as it would come cheaper, would be an inducement to husbandmen and dairy-women to purchase, and apply it. I did expect the Society would have ordered some of them, as Mr. Rack assured me they highly approved of the work, and desired him to signify the same to me; and also that they would take care to have them dispersed as much as lay in their power, for publick benefit. I should have sent one hundred copies to Mr. Rack, if he had lived till after they were published. He had at different times some dozens of the former edition, which he distributed where he thought they would be useful. Messrs. Wilkes, of Leicestershire, who I expect many of the Society are acquainted with, ordered one hundred of them, and have had several dozens of the second edition.

Lately reading in the Appendix to the Monthly Review some remarks from a publication on the physical and chemical properties of milk, translated from the French, I was led to take notice of their  
experiments

experiments touching some things related in my second edition, concerning butter, as their remarks in many respects confirm the opinion I ventured to publish; and this encourages me to give my farther thoughts thereon to the Society, which I wish you to communicate to them, as 'I think all people should render every endeavour in their power to promote publick advantage; and as butter is now become of universal consequence, from its very general use, and many just complaints are made by dealers in it, of an improper management in the making of it, which causes it very soon to turn rancid, and often become of a very foul nature when casked up for trade, and is what I could never meet with any body who could give a rational account of. In my second edition I mentioned it as my opinion, that the cause of butter soon becoming rancid and foul, was, in general, from heating the milk when set up, in order to increase the quantity of cream; a method which I understand is generally used in most counties that make butter for wholesale trade. Thus by heating the oily particles of the cream, it becomes pinguid or greasy; and it is well known that every fat substance that is heated will in a short time become rancid or reezey; as *bacon* does, so far as the heat gets into it. And it is from known causes alone that we can fairly reason to effects.

From

From the publication before remarked, it appears that there is in milk an acid volatile alkaline, and an unctuous particle, besides other chemical properties; among the rest, a fixed alkali; a muriatic or briny acid; it is also remarked, that the volatile substance which flies off, and occasions the particular odour, is peculiar to animal bodies; and although from its volatility it eludes every enquiry into its specifick nature, yet there is reason to imagine that it is a consistent part of the milk, and consequently not destitute of utility.

This is the first time I ever met with any account of the volatile part of milk; but from which I expect many useful observations may be made. It is supposed that churning effectuates a chemical change in the cream; and that the particles of butter cannot be produced by any other method;—that heating cream when on the milk, causes the volatile particles to fly off, and sets the cheesy particles more at liberty; they are apt to rise with the cream and incorporate with it, which causes the butter in a very little time to become foul and rancid, as I suppose the cheesy particles soon separate from the butter; which in a short time makes it foul, as it acquires more of the nature of butter-milk; that the cream that rises without the aid of warmth,

warmth, while perfectly fresh, will yield the most delicate butter, and may be preserved sweet for the longest time. From the method used of heating the milk is produced what is called clouted cream, which I suppose should be termed *clotted cream*, as the warmth causing the cheesy<sup>†</sup> particles to incorporate with the cream, makes it clot and become more mucid or slimy; and if to any considerable degree, will dissolve into 'a cheesy or curdy substance, and appear white and foul, as well as rank and bad tasted, and be affected with a dissolving quality somewhat like to the nature of slip curd in cheese, which I have described in my book, as the greatest evil that attends cheese-making, and what has been the least known or considered by dairy-women.

The reason of offering my opinion to the Society concerning the improvement in making butter, was the hint I mentioned above, concerning the quality of milk; and not having found any thing analagous to it in any author I have met with, regarding butter; and being inclined to urge my opinion that heating cream to make butter is a very improper and hurtful method, and what ought to be discouraged as much as possible, I imagined it cannot be done so well as through a society formed for the improvement of agriculture.

As I published a large edition of my book, the first having gone off very soon, I have some quantity on hand, and I think it will be of great service to dairying to have them dispersed. I shall not publish another edition; as I am convinced that dairy-women and farmers are not people to write for. I think twenty or thirty years hence the work will be better known, and more set by.

I am, with due esteem, your's, &c.

JOSIAH TWAMLEY,

*Warwick, July 16, 1791.*

### ARTICLE XXXIII.

*Remarks on planting Inclosures, &c.*

In a Letter to a FRIEND.

DEAR SIR,

YOU said the other day, you should shortly be concerned in some inclosure bills. Will you permit me to say a word or two respecting the general mode of inclosing? The modern inclosures that I have observed, have universally been made with white-thorn, an article pretty and neat, that will thrive in most soils, and soon make a fence very desirable near a dwelling-house, being of all  
live



live fences most readily kept within narrow bounds, and in any form most pleasing to the proprietor; but like all other live fences, will grow hollow at bottom, and from time to time require new making, when its superfluous branches will not repay the labour: moreover it is annually unproductive of any profitable fruit.

The motives for inclosing open fields are obvious, utility and profit; therefore, as soon as it is determined to divide the land, the second consideration is to divide it with materials that will be both profitable and useful. I have not the smallest doubt, but that if all the hedges in England had been originally planted in the most profitable manner, they would have for centuries past produced, and would continue to produce, beverage, and materials for a sufficient supply of spirits, for the inhabitants of the whole kingdom; and likewise a sufficiency of food for fattening all the hogs,\* and paying the expences of new making, as often as occasion requires; and all this without being more injurious to the land than the hedges now in use. Will you pardon my pointing out a mode, that I am persuaded would produce all these advantages?

To obtain all these benefits, plant at the distance of every twelve, sixteen, or twenty feet, a Spanish

\* Surely not *all*.

chestnut, midway plant a crab, midway between the chestnut and crab plant a common plumb-stock, midway between the several chestnuts, plumb, and crab stocks, plant a white-thorn; when these several plantations have been made three or four years, and are in a thriving state, about the end of February or March, cut them off with a sharp knife, about an inch or two from the ground; they will then throw out many shoots; keep them well weeded, and let them continue growing until the chestnut shoots are large enough for stakes and binders, which will be in about six, seven, or eight years, according as the soil suits the plants; when the plants are formed into a hedge, for which there will be a plentiful supply of steepers, stakes, and all the requisite materials; at the distance of every hundred, hundred and fifty, or two hundred feet, or at whatever distance fancy leads you, leave a straight handsome shoot of the chestnut, to grow into a tree; if you prefer timber, let it remain, and it will grow into a good timber tree: if fruit, let it be grafted with grafts from the best chestnuts you can obtain; it would be desirable if you had an opportunity to procure the grafts from Spain; in like manner leave a straight handsome shoot of the-crab stock, and graft it with an apple; in like manner leave a plumb-stock, and graft it with a damson, or any good

good

good bearing plumb; likewise leave a handsome shoot of the white-thorn, and graft it with a medlar; thus will you have a very productive fruit-garden, that will always continue, as you may perpetually renovate by leaving fresh stocks every time the hedge is new made, without any waste of ground, and a permanent hedge equalled by few, and by none excelled. It is of consequence, as much as can be, to have the hedge on every side belonging to the same field; then, when the hedge is new made, the plough, which is the most effectual protector, will preserve the whole fence without any expence; artificial protection is very expensive, and very uncertain; it is of material consequence to preserve a new-made hedge from the bite of cattle, and perhaps nothing is more destructive than calves, which will go round a whole field and bite off every fresh shoot; asses are likewise peculiarly destructive, as they will not only bite off the fresh shoots, but likewise peel off the rind, and thereby destroy the steepers. Howsoever firm and strong a hedge may be, it will nevertheless give way to violence, on which account it is necessary to have materials at hand to repair any damages that may happen; it is therefore very proper to have in each corner of the field, a stock or two of chesnuts for an occasional supply of stakes, and likewise a stock or two of  
white-

white-thorn for a supply of bushes; this would be no real loss of ground, when in tillage, as the plough cannot reach the extremity of the angles; and when in grass it is best to have the angles a little rounded off, for a malicious bullock will frequently, when it gets an underling into a corner, severely gore it, or force it through the hedge; but should it happen that these supplies are not wanted, the wood of the chesnut will amply repay the value of the ground. It is necessary for every pasture field to have a supply of water, therefore if the soil is compact enough to hold water, a pond should be dug in the lowest corner of every field, and the sides planted in like manner as the hedges, the roots of which will preserve the banks, and the branches in a great measure the water from the exhaling effects of the sun.

The all-bountiful Creator has supplied the earth with a great variety of very productive vegetables, many of which require their peculiar soil and climate; many others will thrive in a variety of soils and climates; many are now growing in the open air in England, that at their first introduction were confined to the hot or green-house. It surely is the duty of man to aim at extending the blessings of Providence. I know the farmer will cry, “no, no, “I want no fruit in my hedges; I don’t want to  
 “tempt

“tempt the idle to break down and destroy my  
“fences.” Believe me, my dear Sir, it is the cry  
of ignorance. Were every field furrounded with  
fruit, no one would need to trample over hedges for  
an handful; and no one would grudge his neigh-  
bour or the thirsty traveller a gratification so easily  
supplied; the farmer would hardly turn his head to  
look at a person gathering a few apples, or picking  
a handful of plumbs; it is the scarcity of the com-  
modity that fills the mind of the farmer with these  
puerile fears.\* I know a very small parish in the  
eastern part of England, where the fruit in a fa-  
vourable year brings into the parish a thousand  
pounds sterling; a sum till lately (if not now) equal  
to the rent of the land; and much of this fruit  
grows along the hedge-rows, not in hedges planted  
in the manner herein described, but from trees  
planted alongside the hedges, which are continually  
extended by fresh plantations every time the hedges  
are new made. A thousandth part of a thousand  
pounds will repay the expence of repairing many  
fractured hedges; and twenty or thirty bushels of

\* A member of the Society who has perused this article remarks, that he knows an estate in Wales, which a few years ago contained a fine fruitful orchard near the farm-house; but on account of the miserable scarcity of orchards, the owner thought himself obliged to destroy this, to prevent the depredations of his neighbours. Wretched state of a country! where the very scarcity of a valuable article must occasion its total annihilation!

fruit per acre would amply repay the injury other crops might possibly receive from the trees.

Chestnuts are exceeding fine food for swine or other cattle; and beyond all doubt much more nutritious than potatoes. For human food, roasted chestnuts are a principal part of the diet of the peasantry in Italy. Apples, almost every one knows how to use. If the produce of plumbs and medlars should exceed the consumption of the neighbouring towns, they would prove sufficient in all probability for dressing hogs to that degree of fatness necessary for fresh or butcher's pork; if they exceeded that proportion, the juice might be fermented and distilled, and would probably yield a spirit superior in strength to malt, and perhaps not inferior to French brandy or West-India rum.

If you have patience to persevere thus far in reading (I am afraid you will think) an uninteresting letter, let me request you not to charge it to my vanity, but to my zeal in endeavouring to point out some improvement in the present barren mode of planting, so universally practised in this kingdom. To one productive tree, an hundred, if not a thousand, barren trees are planted; instead of the fir, the larch, the poplar, &c. why not plant the chestnut,

the walnut, or the beech?—all productive trees. I have known a single walnut-tree produce forty bushels in a year; if no other valuable use could be found for them, would not swine fatten on them? Would mankind but remove the veil of prejudice from before their eyes, and view with a liberal and expanded mind the wonderful works of the great Creator in the vegetable world, what beauties, what treasures would they behold! Food and raiment for millions of their brethren, now pining in nakedness, in want and misery!

I am, your's, &c.

E. C.

*Bath, Nov. 1791.*

*P. S.* I know a gentleman that lives near Ashford in Kent, who has a grove of Spanish chesnut-trees that supplies him with good fruit sufficient for his family, and presents to his friends; and frequently yields a surplus that sells for seven or eight pounds; many of the trees contain seven or eight tons of timber.



ARTICLE XXXIV.

*On the Culture of Rape as Food for Cattle.*

TO THE SECRETARY.

SIR,

I Beg to trouble you with an account of an experiment on Rape treated as cabbage; to which I am encouraged by observing in your publication of premiums for last year, that your Society wished the experiment made. In hopes that my poor mite may not be unacceptable, I trust for your kindly receiving this effort of

Your very obedient servant,

THOMAS J. RAWSON.

*Glasgaly, Atby, May 1, 1790.*

HAVING from repeated successful experiments on sowing Rape on wheat, bere, or barley stubble, (ploughed as soon as possible after reaping the crop) as a spring feed for sheep, determined to try its uses cultivated as cabbage, on the 28th of April\* last, I had a plot prepared as for cabbage seed, and

\* The 28th of April is too early to sow the seed; about the 7th or 10th of May will be the best season.



sown with rape; the plants came up, were very promising, and fit to put out the 20th of June. I had prepared a seven-acre field, which had borne potatoes two years, after being well manured with the common clay gravel, and had it then in fine tilth for turnips. As I had no conception that the rape would rise to such magnitude as to injure the turnips, I marked out furrows with one furrow of the plough at ten feet asunder; laid the rape plants at eighteen inches apart against the upright side of the furrow, and covered the roots by returning the earth which the plough had thrown out with eighteen inch hoes; I then sowed the whole field with turnip-seed by a drilling-machine of twelve inches apart, and bush-harrowed and rolled in the seed without injury to the rape plants. The rape succeeded beyond any expectation I could have formed, so as to overshade and injure the turnips for eighteen inches, at either side, which in the intermediate spaces were a very fine crop; as nearly as I could calculate, two acres of the seven were occupied by rape, and the remaining five by turnips; the rape continued to flourish until the 1st of November, at which time it averaged upwards of twenty pounds per head, (several came up to forty;) such was the amazing luxuriance of the crop, that I dreaded its not standing the winter; and on the 1st day of  
November

November put two hundred large wethers into an inclosure of thirteen acres of light land, which had been eaten bare, and began to give them the rape; they immediately took to it with eagerness, and in three days not a sheep of the whole but would attack the carter for<sup>a</sup> his breakfast; I continued to give it in profusion without hay or any other food, and it not only kept, but very much pushed forward the 200 sheep until the 1st of January. I then began with the five acres of turnips, which (with the help of a quantity of hay) did not last the sheep more than seven weeks, which evidently shews that one acre of rape was equal to three acres of turnips, altho' they were as good a crop as I ever saw; and had the rape been planted in three-foot rows (the manner I now purpose to treat it) and properly earthed, I have no doubt it would have been, if possible, much greater. I kept in a walled yard twenty porkers from the first of September to the first of January on the under leaves; they as well as poultry of all kinds are exceedingly fond of it. I tried some Scotch cabbage, in the same situation of the rape, but they did not average more than seven pounds per head; evidently rape will flourish where a cabbage would not exist; and drought, which is the bane of cabbage, will not affect it. The numberless advantages of introdu-

cing rape in addition to turnips and cabbage, (tho' cabbage ought by no means to be hastily excluded) must be evident to every intelligent husbandman. Two drills, which I left uncut, stood the winter remarkably well; so that my fears were groundless, and I have no doubt but rape will on trial be found to be the most profitable vegetable discovered, for the *first* and *last* of a course of spring-feeding sheep.

I shall beg to add one other remark, which is, that instead of my usual method of ploughing up the stubble, and sowing rape-seed as herein first mentioned, I am determined to sow the seed in a prepared bed the first of July, and when the stubble ground is ploughed and harrowed in September, to put in the plants, which I am convinced must give a ten-fold crop, and would greatly supply the farmer's wants in April following, or *bring an excellent crop of seed in August*.

EXPENCES of an Acre of RAPE.				£.	s.	d.
One year's rent	-	-	-	1	5	0
Three ploughings and harrowings	-	-	-	1	2	6
Three women setting the plants	-	-	-	0	1	6
Two men returning the earth with shovels or broad hoes	-	-	-	0	1	6
A boy and cart attending the sheep 9 weeks,						
at 12s. per week	-	-	-	5	8	0
Seed not worth charging	-	-	-	0	0	0
				<hr/>		
				£.7	18	6

## P R O D U C T.

	£.	s.	d.
Supporting 10 porkers 4 months at 2s. per month	4	0	0
Fattening 100 sheep 9 weeks at 6d. per week,			
being the lowest joisting price	-	22	10 0
Mucking 6½ acres of light land, very well worth			
three pounds per acre	-	-	19 10 0*
			<hr/>
			46 0 0
	Deduct	7	18 6
Clear profit besides the best possible fallow	38	1	6

\* It should seem on the whole that this gentleman may have made a profitable experiment ; but like most others in new experiments, he stretches too far in the estimate of profit. This article seems to be beyond all moderate bounds. The reader therefore will appreciate according to his own judgment.

## ARTICLE XXXV.

*On Maple Sugar of America.*

TO THE SECRETARY.

SIR,

**T**HE Sugar Maple is a natural tree of the woods in the interior parts of North-America, and is very common in particular situations, from the latitude of 35 to 45 degrees; it does not grow near the sea-coast, (at least not in the middle or southern states;) but at the distance of from 100 to 150 miles directly

directly back from the sea, it is found more or less all through the country, as far as the latitudes I have mentioned, and I believe, to a greater extent both to the northward and southward, and as far to the westward as the country has yet been settled.

Sugar has been made from the trees for 30 or 40 years past; but the country where those trees abound being but thinly settled, until very lately, it has not been attended to farther than for a few families, to make sufficient for their own use, and until within these three or four years scarce any has been made for sale.

In the summer of 1788 I was in America, and made an excursion into the northwest parts of Pennsylvania; at the distance of about 100 miles from Philadelphia I first met with Maple Sugar, and from that time until within about the same distance at my return, the country people made use of no other. My curiosity was excited by finding it so similar to the West-India sugar, and led me to make many enquiries as to the manner of their making it, the quantity of sap collected from each tree, the weight of sugar it yielded, and various other particulars respecting it. The farmers being mostly poor people, new settlers, and not much accustomed

accustomed to weights or measures, differed very materially in their accounts, both as to the quantity of sap, and the sugar it yielded, especially as the sap runs much more freely and in greater quantities some seasons than in others. The result of my several enquiries both in those and other parts of the country, led me to conclude, that trees from 18 to 30 inches diameter, which were the sizes generally tapped, upon the average yielded about forty gallons of sap, and this quantity about five pounds of sugar; the sugar trees frequently growing on their best lands, when they wanted the ground cleared, made the farmers indifferent about preserving them, and the common mode of tapping was by cutting a notch in the tree with an ax, which was enlarged by a fresh cut every year; the sap was collected in wood troughs made on the spot from solid logs hollowed out, and the sap boiled down in the wood in their common pots and kettles, handy to where it was collected. Where the trees were of value, and intended to be preserved, some people tapped them by boring a hole with an auger or gimblet; this was requisite to be done afresh every year, or the hole pared larger. The whole of the sap is collected in six or eight weeks, generally beginning to run early in February, and to cease by the last of March or early in April: this being a season of the  
year

year when the farmers have little to do, enables them to pay the greater attention to it, and the expence of manufacturing being little more than their labour, at a season when time or labour is of less value to them than usual, makes it a profitable undertaking; and it is supposed, when the manufactory of pot-ashes is more generally established, the ashes arising from the fuel used in boiling the sugar, made into pot-ashes, will, by increasing their profits, tend much to increase the manufactory of maple sugar.

It has been said in some of the American newspapers, that there were large tracts of land that produced upon the average fifty sugar-maple trees per acre; my own observation makes me think otherwise; though I believe there may be found tracts of 100, perhaps 1000 acres, connected together, that may produce all through from ten to fifteen trees per acre; but to take the general face of the country, for ten miles square, I do not suppose a tract any where could be found to yield more than five trees to the acre of a size fit to be tapped.

On the whole it appears to me that the produce of the sugar-tree is not of sufficient value to make it worth cultivation; but that in America, where the tree

tree grows spontaneously, and where it is found upon large tracts of land that must remain for ages before they can be fully cultivated, it is and will be of considerable advantage to the inhabitants of the country, and that the making of sugar from those trees will become more and more an object of consequence, and be taken up and carried on by people who will make a trade or business of it, although I do not expect America ever will make sufficient for their own consumption; it being an article in so general use, the expenditure will most probably keep pace with the increase of inhabitants.

The sugar-maple tree grows of all sizes as large as from three feet to three and a half or four feet diameter; and in the northwest parts of Pennsylvania, are many of them from 80 to 90 feet high. As a confirmation of my being able to form some judgment of their height, I shall just mention, that I had a white pine-tree cut down for the purpose of measuring its height, and although not more than two feet diameter, it measured 146 feet high, some others near it were four feet diameter, and appeared to be thirty feet higher. Trees of every species in that country were higher than I ever noticed them any where else.



The bark of the sugar-maple is different in appearance from that of the common maple, and not unlike the bark of an English oak ; how far, or whether either of them may be in any respect similar to the English maple, I cannot tell. The leaves of the two American maples appear exactly the same, and I believe there is no material difference in the wood; they are both of a light colour, split fair and easy ; and the common maple is used by the shoemakers for pegs to fasten the heels of shoes together, in preference to any other wood. Some common maple boards have lately been brought to this port from New-England.

All trees while young, that grow in a thick wood of large trees, are slow in their growth, and it is difficult to tell their age by the lines that each year's growth makes ; I should think it probable that few are fit to tap until they are fifty years old, and that the large trees are generally from 2 to 300 years old. The sugar maple abounds most in stony ground, in hilly countries, and where the ground is full of springs, or small brooks of water ; they grow in the greatest plenty on the lower moist grounds, where the soil is most natural to beech, birch, or ash ; and are mixed with a variety of other trees, though but rarely mixed with oak.

In the northern parts of Pennsylvania there are great quantities of a species of pine called hemlock; which with beech, birch, sugar and other maple, ash, elm, wild cherry, and some few others, constitute the timber of the country.

When at Philadelphia I was several times in company with a person who had settled about 150 families on a tract of land called Offego, at the head waters of the Susquehanna; the place was a wilderness in the year 1784, not a single family within many miles of it; I am since informed that last season he collected from those families, his own settlers, and brought for sale, 30 tierces of maple sugar that weighed from 5 to 6 cwt. each.

I have now done with the subject of the sugar maple; but as I am addressing myself to a gentleman who must feel himself much interested in the promotion of agriculture, I shall just mention an article of manure in great use in Pennsylvania, that is scarcely known as such here. There are many hundred tons of plaister of Paris imported yearly into Philadelphia from France and Nova-Scotia; it has generally been sold by the cargo from six to eight dollars per ton weight; it is first broken into small pieces by pounding, and then ground between a pair of mill-stones to a powder, and used in this  
state

state unburnt as a manure for grass and corn land of every kind ; it is supposed one bushel will go as far as ten bushels of lime. The prisoners in the gaol of Philadelphia have lately been set to work to grind it, in small mills, with a pair of stones the same as for grinding wheat, but of a size to be worked by two or four men ; a double advantage has arisen to the state from this, by putting to hard work such men as were deserving of it, and by rendering the article cheaper to the farmers, thereby encouraging them to manure their lands. This hint may be of use to the community here.

I am, your respectful friend,

THOMAS CLIFFORD.

*Bristol, Dec. 13, 1791.*

# ARTICLE XXXVI.

*Observations in a Tour into Suffolk and Surry.*

TO THE SECRETARY.

SIR,

ACCORDING to my promise I send you a sketch of my tours into Suffolk and Surrey. In doing which, I shall be the shorter, as the Annals of Agriculture contain much of the good and uncommon husbandry in those counties.

The

The latter end of March 1788, I visited Mr. Young at Bradfield-hall, where I saw in a large field before his house, about three acres of cabbages, very clean and well managed; and in the same field, divided by hurdles, turnips, and sheep feeding on them: one or two cloathed, to improve their wool: on that part of the field where the turnips had been eaten off, the ground was turning up for barley, and three ploughings were intended, as well for that part where the horse-hoed cabbages were, as for that where the hand-hoed turnips grew.

Mr. Young's course of crops, on sandy loam or gravel, is,

1. To manure for cabbages or turnips.
2. Plough thrice, after either of them, for barley.
3. Clover.
4. Beans.
5. Wheat.

His quantity of manure for an acre of cabbages or turnips, is forty-one horse-put loads per acre. He lays out his ground on two-rod ridges. On wet loam, upon clay, 9s. per acre, after a moderate sprinkling of dung, or other manures, he dibbles on one earth on the middle of the flag, nine inches asunder, two bushels an acre of the small, black,

1. Horse

1. Horfe-beans;
2. Wheat, with
3. Clover, or other graffes.

He pays 3s. per bushel dibbling beans.

Mr. Young carries all his hay and corn in one-horse puts or carts, with a waggon-like apparatus on the body; and thinks them more commodious than waggons.

His sheep-fold, for winter, for a hundred sheep, is littered with wheat-stubble daily in rainy weather, or as often as needful. It is partly under cover, where are racks for hay. He seldom gives them turnips there; they are put in late in evenings, and out early in mornings, in dry weather. In wet, they have hay always; and turnips only in very snowy or stormy weather; depending mostly on hay in the fold.

A farmer would do well to learn of Mr. Young to make more dung than ordinary, and better. He lets his dung-heaps lie dry at bottom, daily throwing upon them the water of the cattle, having shoots to carry off the rain from the hanging roofs of his ox-stalls, entirely out of the court, without carrying off any of the richness of the dung. He has gutters behind his cattle in the stalls, which convey  
their

their water into reservoirs made convenient for receiving it, to be thrown upon the dung.

In April, in warm showery weather, he turns over his dung, a boy standing by with a basket of salt, strewing at the rate of one pound of salt to a cubical yard of dung. He has also a cowl or vessel on wheels, to remove the refuse of the house (dust, &c.) to the farm-yard, which affords several good loads of manure a year.

The weight of his small weighing coop is 1 cwt. 5 lb. The steelyard was made on purpose. The expence of the machine was 26s. It will weigh an animal, or any thing not exceeding 6 cwt.

When turnips are taken up to clear the ground for Lent-crops, it is usual about Bury to cut off the tap-roots, and place the turnips on the ground in a dry pasture, side by side, till wanted. The green is left, and put uppermost. But the green is rarely considerable in lands well adapted to turnips, as they are in that neighbourhood, in comparison to what it is in heavy and strong lands, not very suitable to turnips; where they are apt to run more to green, and less to apple.

I shall not readily forget the obliging and agreeable manner in which I was entertained at Bradfield-hall, and its environs. Mr. YOUNG invited many gentlemen farmers, both of the clergy and laity, to his house; some of whose visits we returned. Their mode of visiting is singularly pleasant and beneficial to the agriculturist; I wish it were introduced into this and every other county in the kingdom. They meet early enough before dinner to walk or ride over each other's farm, and point out in a friendly way any deficiency of good management. It is not difficult to imagine what a spur this is to good husbandry, and their farms shew it: It is of publick as well as private advantage; contributing at the same time to health, pleasure, and profit.

It is well known, that, about Bury, they plough with two horses or oxen, abreast, without a driver. Both at Rougham, and on the road to Bury in their harness, I saw the Rev. Mr. HEDDINGTON's noble team of oxen, of which, or his turnip or other husbandry, I shall say no more than that he has lately given an account of them in the *Annals*, well deserving the attention of the farmer.

But, being struck with the greater novelties in the mode of husbandry of Mr. MURE, of *Great-Saxham*,

*Saxham*, with whom we passed the greater part of two days. I cannot refrain from being somewhat more particular with respect to it. He fats about 180 black cattle a year; many of them Scotch and Welch, feeding them in stalls all the summer, by cutting and carrying to them meadow grafs, vetches, &c. In winter he gives them a peck a day of malted beans. He also feeds them with

Malted barley;

Potatoes;

Cabbages, and chaff or straw cut;

Turnips, and straw not cut;

Bean-meal and water;

Barley-meal and water;

Dry bean-meal, } and, *then*, they are led to  
 Dry barley-meal, } water, twice a day.

Mr. MURE has erected a circular building for feeding 46 head of cattle, tied up at 3½ feet asunder, outside of the circle, with covered reservoirs in the centre for depositing fodder, in inclement weather more especially. The whole was fitted up at a small expence, being made of the thinnings of his fir plantations, and covered with thatch; the cribs wattled or wreathed. The posts, to which the cattle are tied, very little above the crib. A gate



leads into the central part, where there is a way for carts or waggons to go round within the circle, between the stalls and reservoirs for fodder; he makes the greatest provision for dung I ever saw, by his stall-feeding all summer, cutting and carrying tares, grafs, &c. to his cattle, and bedding them on straw or stubble. All the water of his cattle is saved, and daily thrown on his dunghills, as well as Mr. YOUNG's.

Mr. MURE plants cabbages earlier than ordinary for food for his cattle. He was planting a field when I was there, which was the last week in March, in rows wide enough for horse-hoeing, at 20 inches asunder in the rows.

He has a machine for weighing large cattle, which cost him fifteen guineas, besides the building to cover it, &c. Also a machine for grinding potatoes, worked generally by hand, but may be worked by a horse; it is a broad nine-inch wheel, turned in and round a wooden frame, in the manner of grinding bark.

Shortly before I was at Saxham, a bet of a rump and dozen had been determined between Mr. Mure and Mr. Macro; the bet was made at a farmer's club, on the question, Whether turnips drilled and  
horse-

horse-hoed, or sown broadcast and hand-hoed, would produce the best crop? Mr. Mure was on the side of horse-hoeing, Mr. Macro in favour of hand-hoeing; and the point was tried on a field of Mr. Mure's prepared for turnips, which was divided for the purpose, and the crops put in side by side, the length of the field, each party taking care of the crop, according to his adopted plan.

After the bet was determined, I had the satisfaction to see the field of experiment, where the broadcast part appeared to the eye as good as the drilled; but I understood

	<i>Tons,</i>
The produce of the drilled crop per acre was	14 $\frac{1}{2}$
Of the broadcast                    -                    -                    -	10
	<hr/>
Superiority of the drilled per acre                    -	4 $\frac{1}{2}$

Upon which Mr. Macro resolved ever after to drill and horse-hoe his turnips, and procured the proper apparatus for that purpose; but unluckily did not live long to carry his intention into execution.

These turnips were weighed in what they call in that neighbourhood, skippers, (baskets rather long in shape, in which they give turnips, &c. to their cattle,) and it was observed that a skipper full of

the horse-hoed turnips weighed very considerably more than a skipper full of the broad-cast, which shewed that the plant had received great nourishment, and an improved consistence, from the horse-hoe, which produced so much more weight of turnips than the hand-hoe, in the like space or compass, and proved the horse-hoed crop to be of more value in fact than it appeared to be to the eye, in comparison with the other.

But now for a prince of farmers, Mr. DUCKITT, of *Esher-place*. In August, 80, I visited his farm, in company with Messrs. Young and Macro; but not having time enough then to make all the observations I wished, I visited it again in July following.

Mr. Duckitt's farm is the most complete, and kept in the cleanest and best order, of any I ever saw. He ploughs his lands into beds wide enough to contain nine or ten rows of the crop sown in it, at nine inches asunder, for the most part. His farm at Esher is about 500 acres, of which nearly 400 are arable. The land is mostly sand on a gravel bottom; but some of it clayey, and most part of it heavy enough for beans, at least for the smaller sort, tick, or horse-beans.

He

He drills, on his beds of nine or ten rows,

Wheat,

Barley,

Oats, } at nine inches afunder.

Rye,

Barley and clover,

Tares or vetches,	} at eleven inches afunder.
Oats and tares,	
Rye and tares,	
Peas and turnips,	

Beans, at eighteen inches afunder.

After his ground is well prepared by ploughing, he makes five channels or drills with a drill-plough, with as many shares and broad-boards; then his dropping-machine follows, and sheds five rows of seeds, which are covered by an harrow.

When the crop is high enough for the purpose, he has two horse-hoes, which hoe five alleys or intervals apiece, and have each a man to hold and guide them. They work one on each side of the furrow, which divides the beds, into which the field is thrown; of course hoeing at once five rows on each bed, or two half beds. The horse is led in the furrow by a boy, and by the help of a long  
whipple-

whipple-tree draws both the horse-hoes, which completely hoe the ten alleys. When the land is more than ordinarily dry and hard, two horses are necessary for the work. But wet or dry, no injury is thereby done to the crop, the horses always going in the furrow. He has some horse-hoes with six shares, each of course hoeing six alleys at a time.

On Mr. Duckitt's first invention of his horse-hoes, he thought the work would be more regularly and completely effected, if the men who guided the horse-hoes drew them going backward, between the hoes and the draught, which was certainly placing the men in a dangerous situation, in case the horses should become refractory, and uncontrollable by the boy who led them. This was observed by the King, who has several times been pleased to honour this farm with a Royal visit; and his Majesty very humanely, and with great condescension, having communicated his idea to a son of Mr. Duckitt's, the father, in compliance with his Majesty's benevolent design, has made other horse-hoes, which are held by men, who go safely behind the machines.

But Mr. Duckitt informed me, he did not know which did its work the best; and he uses them promiscuously, as opportunity offers, never leaving undone

done or delaying any horse-hoeing, to wait for the use of either. But surely, if those on the latter construction do their work in every respect as well as those on the first invention, a preference will be given to them, when new ones are wanted; and the Royal and humane idea be encouraged and recorded by future practice, to the honour of the Sovereign, and safety of the subject.

It is scarcely to be imagined how completely Mr. Duckitt makes his wheat-mows. They are finely swollen out to that enormous bulk in the middle, tapered up in so beautiful a manner to the top, and so handsomely covered with thatch, that they are perfect pictures. And the largest of those I saw must have contained many hundred bushels of corn.

I had the satisfaction to find Mr. Duckitt sowing a field of eleven acres with turnips. It is amazing with what expedition he proceeds; his field was perfectly ploughed and harrowed; and he carried on his work, according to his usual method when he works with two drill-ploughs, by beginning in the middle of his field. One drill-plough branched off one way towards one side-hedge, the other worked opposite to it, and tended towards the opposite hedge. The drills soon worked on fast  
enough

enough for the after-work, and were followed by two dropping-machines, going in the tracks made by the drill-ploughs, and there dropping the turnip-seeds. After them went a double-zull, or what is there called a strike-furrow plough, to strike up furrows, to throw the work into the beds of ten rows of turnips each, which were dropped at eleven inches asunder. And then followed two horses, one on each side of the bed, in the furrows, which, by means of a long whipple-tree, as long as the width of the beds, drew three light harrows fixed to the whipple-tree, that covered the whole breadth of the bed, and harrowed the whole as it went on. Each harrow had five rows of tines or teeth, and six tines in each row, making ninety in the three harrows; it being necessary that the harrows should be close enough only to cover the seed, and not to sink deep enough to displace the seed, after it falls from the dropping machine.

His drill-plough, after once going, on its return always goes with one share, and sometimes two in the same path it went before, which renders the crops on his whole farm almost inconceivably picturesque to the eye.

His barley and all his crops were the best I had seen; and there are two substantial reasons for their  
being

being so ; his seed is more regularly placed in the ground at a proper depth, and his horse-hoeings promote the vegetation of the plant.

Mr. Duckitt's farm implements are the most perfect of any I have seen. I wish I could do them justice in describing them. I cannot attempt it ; but I must take notice, that his carrot-machine has an iron share and clasp both in one ; moves ground nearly two feet below the surface, without turning over the soil ; and would be vastly serviceable in preparing land for plantations of forest trees ; for, by means of a trenching-plough, with a skim-coulter, going before, and the carrot-machine following in the same furrow, the soil may be well ploughed and opened to the depth of more than two feet. These implements are mostly, if not all, of his own invention. It would be a great improvement to agriculture, if they were dispersed all over the kingdom. Those adapted to preparing the ground, putting in, and cultivating the crop in its growth, would cost about 30*l*. I have got what he calls his trenching-plough, with the skim-coulter, and his bean horse-hoe with two shares. They cost me on the spot nine guineas and a half, and home eleven pounds thirteen shillings.



It may not be improper to explain the skim-coulter. It is calculated for lay ground; in its work it precedes the other coulter, turning the flag down, which, by the other coulter following, is so completely covered, that the edges do not appear and produce weeds and grafs as in common ploughing. It is fit for turning up lay for a bean crop, for which purpose I have used it to advantage.

If a little money from the Exchequer, out of the same fund which pays the bounty on the growth of flax, &c. could be spared, to have complete sets of these instruments sent to the farmers in every county who would make the best use of them, it would be a good thing. I do not like the gloomy ideas of some of my brother farmers, and wish they were less severe on administration. There is no good in being for ever croaking. If peace should continue, I will not despair of seeing encouragement given, at proper seasons, to the truest and most permanent interest of the kingdom, by regulations respecting tithes, general inclosures, provisions for the poor, and many other encouragements to agriculture, particularly to some such plan as Mr. Duckitt has formed,

His plan, for the improvement of national agriculture, is, “ For himself, or some one under his  
“ direction,

“ direction, to traverse the kingdom at the publick  
 “ expence; put in crops, on his principle, on all  
 “ kinds of soil; and for due attention to be given,  
 “ at the publick expence, to bring those crops to  
 “ perfection: after which, the farmers may follow  
 “ his plan, or pursue their own at their discretion.”

Mr. Duckitt himself may be now too far advanced in years, and settled in business, to be disposed for such an undertaking in person; but has sons brought up under him, who may be very capable of doing the more active part under his direction.

I shall conclude this tedious detail, with an account of a singular honour which was shewn Mr. Duckitt by the late Marquis of Rockingham, which I think he richly merited, and continues to merit more, by demonstrating the great benefits that may be given to agriculture, by the horse-hoe, &c.

The favour I allude to, which the Marquis shewed Mr. Duckitt, was presenting him with a large silver cup, of considerable value, with the following inscription on it:

“ TO WILLIAM DUCKITT, farmer, who by mechanical skill, sagacious observation, and diligent  
 “ pursuit,

“pursuit, rendered the principles of TULL practi-  
 “cable and profitable, and thereby perfected the  
 “culture of light soils, CHARLES Marquis of Rock-  
 “ingham, as a token of his regard to such publick  
 “merit, has presented this cup, in the year 1774.

“*Bonus civis bona agricola !*”

I am, respectfully,

Sir, your obedient servant,

R. PROCTER ANDERDON.

*Henlade, May 16, 1792.*

# ARTICLE XXXVII.

*On the expediency of Sowing Wheat occasionally in  
 the Spring.*

TO THE SECRETARY.

SIR,

WHEAT being the grain of which bread is  
 chiefly made in almost all Europe; it well  
 deserves the most diligent care and attention of the  
 farmer. From the very high price it has been sold  
 at for many years past, it should seem the produce  
 has not been so great in proportion to the consump-  
 tion

tion as formerly. Would it not therefore be prudent to promote its cultivation by every means consistent with convenience and general œconomy?

In the enumeration of modern improvements, that of sowing wheat occasionally in the spring should not be omitted. By *spring* wheat seems to be meant, by writers on this subject, a species of wheat of a peculiar nature, particularly appropriated to that season. Whether there be a real specifick difference between this and the wheat that is in common use, or whether it is a distinction without a difference—a manœuvre fabricated by the singular ingenuity of the times, is more than I am able to say at present; but I never hear of spring wheat at 12s. a bushel, but Carolina grass feed at two guineas a quart immediately pops into my head; nor can I think of such superlative ingenuity unaccompanied by the idea of a SUITABLE REWARD. Such is the power of association!

But whether spring wheat be a species totally different from the sorts in common use or not, the farmer need not be solicitous about it, for I can assure him, that every species of wheat in common use among us, if sown in February, will produce good plump corn, and be ripe and fit to reap in  
good

good season, as I have repeatedly experienced several years past. I have sowed red lammas, white lammas, bearded or cone, and white wheat from America, called by some Quebeck wheat, all which succeeded equally well. Oct. 28, 1789, I sowed about nine acres, part of a field of fourteen, with white cone wheat; the remainder of the field was so foul and out of tilth, that I determined not to sow it till spring; and not with wheat then, unless it could be got into proper tilth. I had it ploughed into very narrow ridges, and in that condition it remained till the 9th day of February, when it was sown on four-bout ridges, four rows on each ridge. It cut a very poor figure till the month of May, infomuch that the farmers in the neighbourhood advised my man to plough it up and sow it with barley. From this time it grew away at a great rate, and was in all respects as good corn as any that grew upon the farm; and though of a species that is later in ripening than most others, it was not above eight or ten days later than that which was sown in October in the same field.

It is not meant by this to insinuate, that sowing wheat in the spring is preferable to sowing it in the autumn. The autumn, *communibus annis*, is on many accounts to be preferred. But I am thoroughly convinced

convinced, that when from the unseasonableness of the weather, the foulness of the ground, and not being in proper tilth, it would be imprudent to sow it, the giving it three or four months fallow at that season would give a manifest superiority to the crop sown in February over what might be sown in November, abstracted from the consideration of all injury corn sown so late in the season is liable to from frosts, &c. in its young and tender state.

It is true there can be no certain dependance upon sowing in February. Frost and snow so frequently happen in that month as to render sowing sometimes impracticable: should it so happen, the soil will be in an improved condition for beans or oats in March, or still more, if convenient and suitable, for pease or barley in April. Now, after a winter's fallow of five or six months, I am decidedly of opinion, that a crop of either of the articles above-mentioned, even without manure, would be more profitable than a crop of wheat sown in autumn in ground that was foul and in imperfect tilth, though manured at an expence of several pounds an acre. It should never be forgot, that it is the net profit, and not the gross amount, that is the true and only proper object of the farmer's pursuit.

To thoroughly pulverize the soil, and keep it clean from weeds, is a maxim the farmer should never lose sight of; it is the true *sine qua non* of successful husbandry. If this be duly performed, and the land planted in proper season, scarcely any soil is so poor as not to bear a profitable crop; nor any so rich and fertile as to be attended with profit without it. To manure ground that is out of tilth and full of weeds, is to give strength and encouragement to its greatest enemies, who are perpetually counteracting, and at length defeating the planter's utmost endeavours. But let him continue to plough them in till they are in a great measure overcome, they will then prove the means of increasing the fertility which otherwise they would have destroyed.

I have often sowed wheat in November, very seldom with tolerable success, often with bad; I have therefore left off altogether sowing so late in the year; being convinced, from the experience of some years, that February is a much better season, independent of the benefit accruing from three or four months fallow at that season of the year, which indeed I find very great.

Wheat sowed, I suppose, the middle of November, seldom or never comes up till the latter end of  
December;

December; then just as it begins to appear, and is in its very tenderest state, it has two of the severest months in the year to contend with; when the rigour of the climate generally shews its utmost severity, and frequently destroys great quantities of corn in this its infant and most tender state.

I am, Sir, your most obliged servant,

JOSEPH WIMPEY.

*North-Bockhampton, Feb. 28, 1792.*

#### ARTICLE XXXVIII.

##### *On the Culture of POTATOES.*

**T**HIS root is of vast importance, whether it be considered as a food for man or beast. Its utility seems to be so universally acknowledged, that every communication respecting its culture must be well received by the publick.

If the following experiments on a root which cleans and enriches land, at the same time that it affords means of keeping a large stock of cattle in the winter season, should tend to the total exclusion



of a summer fallow on *light lands*, I shall think I have not written in vain, nor will my speculation be altogether useless.

This root has not till lately been the object of general attention; even the improved counties of Norfolk and Suffolk, a few years ago, knew nothing of it, otherwise than as a garden production. In the county of Somerset, I well remember the time when it was an extraordinary thing for a man to have a field of potatoes; and now, I may safely say, there are hundreds of acres every year; and to this, possibly, the low price of wheat may, *in part*, be attributed. In poor families it is almost the whole subsistence of the children; and a failure of the potatoe is equally alarming with the failure of the wheat crop. Still, there are few counties the inhabitants of which have spiritedly entered into the cultivation of this root, on a large scale, as a *food for neat cattle, hogs, and sheep*.

The turnip husbandry has been considered as the *ne plus ultra* of good farming; and that most useful animal, the sheep, is almost solely dependant upon *that* root for winter provender. Is it not therefore worth while to take their *comparative* excellence into consideration? I would wish to engage the  
attention

attention of my reader, whilst I draw a fair comparative estimate of the expences and produce of a turnip and potatoe crop. I have in neither instance, charged *rent*, or any thing for manure, as I conceive their demands in that respect equal.

EXPENCES.

TURNIPS.			per acre.	POTATOES.		
			£. s. d.			£. s. d.
5 ploughings	-	0	15 0	2 ploughings	-	0 6 0
4 harrowings	-	0	4 0	1 harrowing	-	0 1 0
Seed	-	0	0 9	Planting	-	1 1 0
Sowing	-	0	0 3	Seed	-	2 0 0
2 hoeings	-	0	7 6	Hoeing	-	0 7 6
				Digging up, &c.	2	0 0
			7 6			5 15 0

PRODUCE.

If a very good		}	3 0 0	If a very good		}	12 10 0
crop	-			crop, 100 sacks			
				at 2s. 6d. per			
				sack*			

Even on the most superficial view, the superiority of potatoes is apparent, but when you take into consideration the certainty of one crop, and the uncertainty of the other, a farmer must be an infidel indeed who will not acknowledge it.

Perhaps this might fairly have been put higher.

It is well known that turnips are liable to many accidents. In their infant state, the *fly*, or, perhaps more properly speaking, the *slug*, demolishes them. If they escape this enemy, and get into rough leaf, the black canker attacks them, and leaves, in a few days, a whole field anatomized.

Should they survive all maladies, and come to ever so great perfection, a severe frost, or deep snow, debars you from making the most of them, and after all, it frequently happens, that in the months of February and March, a severe frost following a wet day, destroys your whole crop, and deprives you of every resource, save the hay-mow.

Not so *potatoes* :—when pitted and well secured, they are safe from all risque, (the pilfering hand excepted) and are as good in the months of March and April as in October or November.

To recommend the culture of potatoes on a large scale as a food for man would be absurd; and few farmers would attend to any recommendation of them as a food for cattle, unless their value be fairly ascertained.

To determine this point, I began eight years since a course of experiments, the result of which I

now

now lay before you, hoping that if any error in calculation may have crept into the statements, your readers will attribute it to hastiness of writing, and not to a design to mislead.

Many tempting, and I fear exaggerated accounts have been given of the produce and value of potatoes; and in this respect, I must confess myself to be in some measure guilty;—for, by a reference to vol. iii. of your Papers, you will find that I estimated their value as a food for hogs, at 4s. per sack, (240lb.) and I at that time verily thought such a representation to be the fair, unbiassed result of an experiment honestly conducted; but subsequent trials have made me alter my opinion; and I see the impropriety of drawing certain conclusions from a solitary experiment.

Potatoes should not be viewed merely in the light of profit, but as the means of cleansing the land, and preparing it most excellently for a corn crop. There is a great difference between an expensive fallow, and a profitable fallow crop: the farmer, therefore, should be contented, if they pay the expences of an ample manuring, and keep the land clean.

I have

I have been informed that potatoes have been raised to the amount of 1000 bushels per acre, but my experiments are not so flattering; and possibly, those great crops were on a *small scale*, and from a garden, which might be nearly a mass of putrid manure.

Such experiments are always precarious. I have never had a greater produce than a sack in a perch, or 160 sacks per acre; though I know it is possible to raise a greater quantity of some sorts; such as the *Surnam*, the *Ox-noble*, and the *Horfe-legs*; but are these potatoes so nutritious? I think not.

It may be expected that I should say something of the *curl* disease, to which this root is in some degree liable; but I must confess, that notwithstanding all my attention for twenty years past, during which time I have been in the constant habit of planting on a large scale, I cannot speak *decisively* on this subject. It seems involved in impenetrable mystery. I have planted from the same pit of potatoes on the same day, in the same soil, prepared with the same manure; part of the crop has come curled, part not; nay, I have known two shoots from the *same* set, the one curled, the other not. I have raised from seed, and been careful to gather the seed, from the finest and most flourishing plants; they

they have been in every respect as subject to the disorder as the cuttings of old seed. Lest the *beat* of the pits might be injurious, I have covered them in the place where they grew, and left them *undug* till the time of planting;—all the same! I have planted before they shoot out, and after;—no difference!

In short; I once planted two tons of potatoes in the month of June, which were more than half rotten, and purchased at a trifling sum of a captain of a Dumfries ship, on Bristol quay, and I never had a much better crop.—What certain conclusions then can be drawn from these premises—but that, with all our wisdom, we are perfectly ignorant of some of the most simple operations of nature?

I forgot to say, that I have been in the habit of planting *whole* potatoes, *large* cuttings, *small* cuttings—nay, the mere eye of the potatoe only; but I never could see any difference in respect to the *curl*. If the potatoe was *disposed* to be curled, it proved almost equally so in all methods; and on the other hand, I never knew a true Dumfries potatoe come curled the *first* year; perhaps the *second* year a few would be curled; but beware of the *third*; for be assured, let your soil or manure be ever so good, almost all will be *curled* the third year, if planted in the *same* soil or neighbourhood.

As

As to the land most favourable to this root, there can be little doubt:—A rich sandy loam is the best; but potatoes may be grown to advantage on all soils of a *loose* texture.

The richer the land, the more abundant the crop, which varies from 50 to 150 sacks, (240 lb.) per acre; but let not the farmer confide too much in the strength of his soil, to the exclusion of manure; not less than twenty cart-loads of which should be put on an acre; by cart-load I mean 30 bushels. Of all manures, horse-dung, *well rotted*, is the best; next to it, hog's dung; after that, all other sorts of animal dung.

Lime, marle, chalk, soaper's ashes, and rags, do but little good; and in some instances do harm, by making the potatoes scabby. Green vetches, or clover, covered in by planting, is good manure.

Endeavour, as much as you can, to plant in dry weather, either in the months of April or May. Use large sets; that is, pick out the largest and finest potatoes for seed, and slice them in two pieces, from the crown to the root. Notwithstanding the experiments of your learned and indefatigable correspondent Dr. ANDERSON seem to justify him in recommending

recommending *whole* potatoes for seed, my trials have all led to a contrary conclusion; and I much wish, that your regular correspondents would give their opinion on this subject; from such aggregate of information, some decided opinion might be formed.

Change your feed every *two* years, and go as far from home as you can for a supply. In the vicinity of Bristol, perhaps the *Scotch* feed, imported from Dumfries, is the best.

Do not cover your sets in planting with more than three inches depth of earth, and be particularly attentive to the *rocks*, which by their sagacity of smell will find them out, and would make great depredations. After the plants have been up about 3 weeks, let your hoers to work; but by no means let them be used after the plants begin to throw out their stings, and form their bulbs: should any scattered weeds arise, remove them by hand-work.

If labourers can be got, prefer *digging* to ploughing up; and when you dig, compel your men to thrust their spade under the potatoes, and not dig in perpendicularly; by this means they avoid cutting the roots. Never dig up in wet weather; and as fast as dug, secure them in the following manner: make

a trench



a trench in a dry part of the field, eight inches deep and four feet wide ; spread a thin layer of dry straw on the bottom, and against the sides ; then throw in your potatoes, and raise them to the height of four feet, leaving the top shelving in the form of a roof ; on the potatoes thus placed, lay a bed of dry straw six or eight inches thick, and cover the same with mould, dug from the sides of the pit, and patted on to the thickness of a foot ; after this, let your thatcher cover it with straw, or the haulm of the potatoe, sufficient to keep out the rain.

In this way, I have kept many thousand sacks through the most severe winters, without injury.

There are various methods of planting ; but it may be right to divide them under two distinct heads, viz. the *drill* and the *promiscuous*. Both these may again be subdivided ; but as it is not my design to fatigue my reader, by entering into a discussion on their respective merits, I shall only say, that my experience leads me to prefer the *promiscuous* mode ; and to plant in beds five feet wide, intervals or alleys three feet, dug and thrown on to the beds, and the sets one foot apart. In this way let the season be ever so wet, the potatoes lie dry. You also, in hoeing, have access, without treading  
on

on them; besides, being planted so close, such a putrid fermentation is created by the thick shade of the potatoe, that the soil is more meliorated, and weeds more compleatly destroyed, than in any other method. Horse-hoeing cuts the potatoes, and tears the fibres or strings on which the bulbs are formed.

I shall now proceed to a detail of my experiments, which comprehend seven years trial on a pretty large scale, and in various ways of planting, and though many, who have been sanguine in their ideas respecting this root, may be disappointed at the collective result, I can only say, that perhaps as much benefit may accrue from recording an unsuccessful as from the most flattering and successful experiment.

1784.

EXPERIMENT NO. I. SEVEN ACRES.

Culture, expences, and produce, of a field of seven acres, soil a gravelly loam, on a bed of limestone rock, value about 8s. per acre. This field was, in 1783, part of the forest of Mendip, and was in its *uninclosed* state worth about 3s. 6d. per acre.

EXPENCES.

EXPENCES.

	£.	s.	d.
Cutting furze and levelling inequalities, 5s. per acre	-	-	-
1783, <i>October.</i>	1	15	0
Ploughing first time, 12s. per acre	-	4	4
1784, <i>March.</i>	0	0	0
Cross ploughing, 10s. per acre	-	3	10
<i>April.</i>	0	0	0
Dragging with heavy and long-tined drag, 6s. 140 quarters of lime, 1s. 4d. per quarter	2	2	0
Carriage of ditto, 6d. per quarter	-	9	6
<i>May.</i>	0	8	0
Spreading lime, 9d. per acre	-	3	10
Harrowing in lime, 1s. per acre	-	0	5
Third ploughing, 3s.	-	0	7
Harrowing, 1s.	-	1	0
Planting in beds 8 feet wide, alleys 4 feet	-	0	7
49 sacks (240lb. each) Scotch seed, 6s. per sack	14	14	0
[N. B. Sets a foot apart.]			
Cutting sets at 3d. per sack	-	0	12
<i>June.</i>	3	0	0
Keeping off birds	-	0	6
Hoeing, (beer included) 5s.	-	1	15
<i>July.</i>	0	0	0
Earthing up plants with the loose earth of the alleys, 5s.	-	1	15
<i>October and November.</i>	0	0	0
Digging up and securing, 40s. per acre	14	0	0
Rent (no tithe)	-	2	16
Interest of capital, 5s. per acre	-	1	15
Total cost	£.70	7	2

PRODUCE.

PRODUCE.

Five hundred and five sacks, prime cost, 2s. 10d.	£.	s.	d.
per sack or thereabouts - - -	£.	1	10 10

OBSERVATIONS.

Many of my readers will, I doubt not, be surprized at the heavy expence of this crop, and yet even with my present experience, I can see but *one* extravagant charge, and that is, digging out; this amounts to 5d. per sack, allowing near 4l. for pitting and securing; perhaps it should have cost no more than 4d. per sack.

As to the quantity of seed, which may surprize some, I must notice that planting *large* sets requires a much greater quantity of seed than when *small* sets are used.

The charge of interest on capital I have long adopted, and I think it right; as to the quantum, it is fixed on the following principles. One hundred acres of land, supposing them to be worth on an average 20s. per acre, require 500l. capital; consequently the interest at 5 per cent. amounts to 5s. per acre.

After all, however, here is a rough piece of land, which in its uninclosed state, was worth only 3s. an acre,

acre, brought by *one* crop unto such a state of pulverization and amendment, as to be worth 15s. and all the expences paid, supposing the potatoes to be worth 2s. 10d. per sack.

This field was sown with wheat, but the time of sowing was inevitably protracted to a late season. In a cold climate, and on a *light* soil, never sow *wheat* after potatoes, but ridge up your land, and leave it for a spring crop, and perhaps on *any* soil it is good husbandry so to do.

1785.

EXPERIMENT NO. II.— 8 ACRES.

III.—12

IV.—12

---

32 acres.

NO. 2, EIGHT ACRES,

Soil a gravelly loam worth 20s. per acre, had been laid down with sainfoin 3 years before, which did not succeed. This field was marked out into beds, 8 feet wide, leaving 4 feet interval to cover with. Farm-yard dung, 20 cart-loads to an acre, was then spread equally on the beds, and the sets placed thereon at the distance of one foot. The interval or alley was then dug to cover the sets, turning the grafs downwards, or turf to turf. This is called by some the lazy-bed method.

EXPENCES.

EXPENCES.

	£.	s.	d.
<i>1785, April.</i>			
Setting at 1l. 11s. 6d. per acre -	12	12	0
Liquor -	1	11	6
Seed, 7 facks to an acre, 5s. 6d. -	15	8	0
Manure at 3s. per load (carriage included)	24	0	0
Cutting fets at 3d. per fack -	0	14	0
<i>May.</i>			
Hoeing, 5s. per acre -	2	0	0
Earthing up and shovelling alleys -	2	0	0
<i>July.</i>			
Hand-weeding, 2s. 6d. -	1	0	0
<i>October.</i>			
Digging and securing -	14	3	0
Rent and tithe, 25s. -	10	0	0
Fences and highway, 6d. per acre -	0	4	0
Interest -	2	0	0
	<hr/> 85 12 6		

PRODUCE.

564 facks, prime cost 3s. per fack.

NO. III. TWELVE ACRES,

Same soil as the foregoing;—was in oats 1784; the stubble ploughed immediately after harvest. In March 1785, it was cross-ploughed, and well harrowed; lines were then drawn longitudinally, with a double-breasted plough, at the distance of four feet, and in this furrow farm-yard dung was strewed, after the rate of 12 loads per acre; on

VOL. VI. A 2 this

this the sets were put, at the distance of 9 inches, and then covered with a light plough. After the potatoes were about six inches high, a furrow was turned from *one side* of the plants, and in a week after, another furrow from the *other* side. They were then hand-hoed between the plants, after which the earth on the interval was returned to the plant, by the double-breasted plough. They were after this hand-hoed lightly. Great attention was necessary to keep off the rooks, both after planting, and after the bulbs were formed; for the wide intervals, and the elevation of the soil on which the potatoes grew, gave them an opportunity of free access, and I verily believe, had they not been narrowly watched, they would have totally destroyed the crop. As it was, they did a great deal of damage. Previous to digging out, a furrow was turned in the middle of the interval, so that the diggers had only a narrow flip of earth to turn over.

## EXPENCES.

			£.	s.	d.
1784, <i>October.</i>					
First ploughing oat-stubble, 3s.	-	-	1	16	0
1785, <i>March.</i>					
Cross ditto, 3s. per acre	-	-	1	16	0
Harrowing, 1s.	-	-	0	12	0
<i>April.</i>					
Marking out furrows	-	-	0	5	0
Carried over			£.4	9	0

			£.	s.	d.
	Brought forward		4	9	0
Manure, 3s. per load	-	-	21	12	0
<i>May.</i>					
Spreading manure, planting, &c. 15s. per acre			9	0	0
Seed and cutting, 5 facks to an acre	-	-	21	12	0
<i>June.</i>					
Horse-hoeing, 3s. per acre	-	-	1	16	0
Two hand-hoeings, 5s. per ditto	-	-	3	0	0
Keeping-off birds	-	-	1	4	0
<i>October.</i>					
Turning furrow for potatoes	-	-	0	6	0
Digging up and securing	-	-	14	11	0
Rent and tithe, 25s. per acre	-	-	15	0	0
Fences and highways, 6d. per ditto	-	-	0	6	0
Interest, 5s. per ditto	-	-	3	0	0
			<hr/>		
			£.95	16	6

## PRODUCE.

621 facks, prime cost, 3s. 1d. per fack.

Part of this field was planted with my own feed, and part with Scotch feed, then imported. The *latter*, the best crop by nearly one-third.

*N. B.* Should any of my readers think that the price of ploughing is too low, I would inform him, that my ploughing is all performed with the double-furrow plough, with which my man can with ease turn  $2\frac{1}{2}$  acres in eight hours with four oxen. I have known him plough 20 acres of land, four

A a 2

inches



inches deep, and nine inches wide, in six days. This may appear incredible to some, but it is nevertheless true, and can be done again if required.

#### NO. IV. TWELVE ACRES.

Soil the same as the last. Quality of land the same; preceding crop and cultivation before planting the same. A furrow was then turned about 3 inches deep with a light plough, from north to south; and the manure being brought, and deposited in small heaps, at a little distance, the planters (women) began by putting down the sets at about twelve inches distance in the furrow, and then covered them with a sprinkling of dung.

The men then followed, and, at the distance of 18 inches from the ploughed furrow, dug a trench of the same depth, parallel thereunto, and deposited the contents thereof on the potatoes planted. In this *dug* trench another woman and man proceeded in the same way, so that the potatoes were set in rows 18 inches apart, and one foot from plant to plant.

The same seed, and the same quantity of manure, were made use of in the preceding experiment. In the beginning of June, they were carefully hand-

hand-hoed at 6s. per acre. After this no other attention was necessary, as the plants grew so thick, and so entirely covered the land, as to smother all weeds. When the soil is good, and plenty of manure can be afforded, this is an excellent method; the earth is not poached by tread of horses, and by digging is deposited so *lightly* on the potatoes, that the roots are not checked in their extension. I do not approve of very wide intervals, either in corn, pulse, or roots; and perhaps the drilling of corn, which seems to be the rage of the day, will be but a short-lived practice. I could state many objections to it, arising from my own experience; but I do not from this infer that it is not an eligible plan on *very poor soils*, which want summer hoeings to enable them to bring their crops to perfection.

## EXPENCES.

			£.	s.	d.
First and second ploughings and harrowing, as in preceding experiment	-	-	4	4	0
Manure	-	-	21	12	0
1785, <i>May</i> .					
Planting, 18s. per acre	-	-	10	16	0
Seed, 96 sacks, at 6s. per sack	-	-	28	16	0
<i>June</i> .					
Hand-hoeing, 6s. per acre	-	-	3	12	0
Keeping off birds (rooks)	-	-	0	9	0
Carried over			£.69	9	0

<i>October.</i>			<i>£. s. d.</i>
	Brought forward		69 9 0
Ploughing out, 20s. per acre	-	-	12 0 0
Carriage, pitting and securing	-	-	6 0 0
Rent, &c. as before	-	-	18 6 0
			<hr/>
			£.105 15 0

## PRODUCE. ,

968 sacks, prime cost 2s. 2d. per sack.

## OBSERVATIONS.

In this experiment, I endeavoured, as much as possibly I could, to ascertain the comparative preference due to ploughing or digging out, and I found that a plough with two horses, a man, a boy, eight women to pick up, and two men to carry to the waggons, could clear but little more than half an acre a day. The expence cannot therefore be calculated at less than 20s. per acre.

These potatoes I could have had dug and carried to the pits (if in the same field) at four-pence per sack, or 11. 6s. 8d. per acre. Now the saving of a few shillings per acre is no compensation for the quantity bruised by the tread of horses, the number left in the ground, let the pickers be ever so careful—and the want of pulverization, in comparison with digging:—besides, scarce any mode of planting could have been selected for plough-work so favourable as this. Had the potatoes been planted  
on

on ridges, with intervals, the digging might have been performed at less expence than the ploughing. From this and many other trials, I am inclined to give the preference to digging up, and in all cases where labourers can be procured.

1786.

EXPERIMENT NO. V.—FIFTY ACRES.

Soil, woodcock loam, 18s. per acre;—these were two fields of a four-years old ley, and mossy; they were ploughed in November, cross-plough'd in March, then harrowed and planted in May, in beds five feet wide, alleys 3 feet.

EXPENCES.

1785, *November.*

			£.	s.	d.
Ploughing at 5s. per acre	-	-	12	10	0
	1786, <i>March.</i>				
Ditto, 5s. ditto	-	-	12	10	0
Harrowing, 2s. ditto	-	-	5	0	0
	<i>April.</i>				
500 quarters of lime, at 1s. 10d. delivered	-	-	45	16	0
600 loads of dung, 3s. per load	-	-	90	0	0
Seed (part Scotch) 400 facks, 7s. per fack	-	-	140	0	0
Cutting feed and planting, 19s. per acre	-	-	47	18	0
Keeping off rooks	-	-	1	19	0
Hoeing with a spade, called spiddling	-	-	27	0	0
Digging-up and securing	-	-	81	0	0
Rent and tithe	-	-	50	0	0
Carried over			£.513	13	0

		£.	s.	d.
	Brought up	513	13	0
Fences and highways	-		1	5 0
Intereft of capital	- - -		12	10 0
		<hr/>		
		£.527	8	0

PRODUCE.

3850 facks, prime coft 2s. 9d. per fack.

OBSERVATIONS.

Half of the foregoing 50 acres was fown with wheat in the beginning of November, the other half was ridged up, and left for a fpring crop, and was accordingly fown with white oats in April ; the re-  
fult of which was, that the crop of oats was un-  
commonly fine, and the wheat very indifferent,  
having been destroyed by the grub or earth-worm  
in the winter.

This refult has been confirmed by many experi-  
ments ; therefore, on a light foil, avoid fowing  
wheat ; and rely on it, that an oat crop in fuch  
cafes will turn out of more value than a wheat crop ;  
befides, you proceed in a better courfe of cropping,  
and this is of effential importance.

1785.

EXPERIMENT NO. VI.— 8 ACRES.

VII.— 2

VIII.—50

---

60 acres.

## NO. VI. EIGHT ACRES,

Of a kind of black earth, approaching to peat, and under it, at the depth of four inches, a strong white clay.

This kind of soil is as light as chaff, and will not bring any kind of corn (buck-wheat excepted) to perfection. I had limed it, and sown it with oats in 1786, but they all withered away before they came out into ear, though at their first coming up they looked beautifully flourishing.

After fallowing this field, I planted it in ridges five feet wide, and alleys three feet. In digging the intervals or alleys to cover the sets, I made the men dig deep, and bring up two or three inches of the clay. After hoeing, they were earthed up with two or three inches more of the clay, so that the beds were elevated at least a foot above the alleys. When they were dug out, I gave the men 5s. per acre extra to dig the beds down to the level of the alleys; by these means a large portion of clay was intimately mixed with the light spongy surface.

This entirely remedied the defect in the soil, and the field produced the subsequent year a very good

good crop of oats, and from that time has been worth 20s. per acre.

## EXPENCES.

1786, <i>November.</i>		£. s. d.
Ploughing oat-stubble, 3s. per acre	-	1 4 0
1787, <i>April.</i>		
Cross-ploughing, 3s. per acre	-	1 4 0
Harrowing, 2s. per ditto	-	0 16 0
Lime put on last year, and no crop	-	14 8 0
Planting at 25s. per acre	-	10 0 0
Seed 64 sacks, at 6s. per sack	-	19 4 0
Cutting sets, 3d. per sack	-	0 16 0
<i>June.</i>		
Hoeing, 4s. per acre	-	1 12 0
<i>July.</i>		
Earthing up, 10s. per acre	-	4 0 0
Bird keeping	-	0 6 0
<i>November.</i>		
Digging out and securing, 35s. per acre	-	14 0 0
Rent	-	4 0 0
Fences, &c.	-	0 4 0
Interest of capital	-	2 0 0
		<hr/>
		£.73 14 0

## PRODUCE.

564 sacks, prime cost 2s. 8d. per sack,

## NO. VII. TWO ACRES.

This land was part of the forest of Mendip, and a portion of my allotment on the division of the common belonging to the parish of Shepton-Mallet.

**Mallet.** This was valued by the commissioners at 2s. 6d. per acre. In the month of March I set fire to the furze; after which the field was marked out in beds eight feet wide, allowing intervals of four feet for the alleys. On these beds hog's-dung was spread, after the rate of 30 cart-loads per acre. On the dung the sets were deposited, 18 inches by 9.

The rough surface of the intervals or alleys was then skimm'd off, and placed between the sets; after which a spit of mould was dug to cover with, leaving the loose earth or crumbs to be shovelled in after the potatoes were up.

The produce of this field being well secured, was kept to the following May, and then all sold at the price of 9s. per sack. This exhibits a remarkable instance of the value of a potatoe crop in some circumstances. The produce amounted to forty times the value of the land in fee.

## EXPENCES.

	1787, <i>March.</i>		£.	s.	d.
Burning furze	-	-	-	0	1 0
	<i>April.</i>				
Planting, 35s. per acre	-	-	3	10	0
Dung, 3s. per load	-	-	9	0	0
Scotch seed and cutting	-	-	6	0	0
			<hr/>		
		Carried over	£.	18	11 0



	<i>May.</i>	<i>£. s. d.</i>
	Brought forward	18 11 0
Hoeing	-	0 10 0
	<i>June.</i>	
Shovelling alleys	-	0 10 0
	<i>November.</i>	
Digging out, 4d. per sack	-	3 13 4
Securing	-	1 0 0
Rent	-	0 5 0
Fence	-	0 1 0
Interest	-	0 10 0
		<hr/>
		£.25 0 4

PRODUCE.

220 sacks, prime cost, 2s. 3d. per sack.

NO. VIII. FIFTY ACRES,

Of a three-year's old ley, planted in the lazy-bed method.

EXPENCES.

1787, *April.*

To 1000 loads of dung, at 3s. per load	-	150 0 0
Planting 8 feet by 4, 30s. per acre, (or 6d. for every 20 yards in length)	-	75 0 0
Seed and cutting, 400 sacks, 5s. per sack		100 0 0

*May.*

Hoeing, 5s. per acre	-	12 10 0
Earthing up, 5s. per ditto	-	12 10 0

*October and November.*

Digging out, 6d. per score yards		75 0 0
Securing	-	4 0 0
Rent and tithe, 25s.	-	62 10 0

Carried over £.491 10 0

			£.	s.	d.
	Brought forward		491	10	0
Fences and highways	-	-		1	5 0
Interest of capital	-	-		12	10 0
			<hr/>		
			£.505	5	0

PRODUCE.

3680 sacks, prime cost, 2s. 9d. per sack.

OBSERVATIONS.

Here is a most ample and expensive manuring, and yet the potatoes do not cost more than 2s. 9d. per sack.

A crop of turnips would, in similar circumstances, and in point of total expence, be about 200l. less; but were they ever so abundant a crop, they would not be worth more than 150l. so that a loss of 150l. would ensue when compared with potatoes, supposing them worth 2s. 9d. per sack.

1788.

EXPERIMENTS NO. IX.— 7 ACRES.

X.—80

XI.—10

XII.—20

---

117 acres.

NO. IX. SEVEN ACRES.

Soil, rich loam. This field was drilled barley in the year 1787; the stubble being very clean, it was plough'd after harvest into 32-feet ridges, that it might be dry in the winter.

In the month of March a furrow was turned between the ridges, after which it was cross-ploughed and well harrowed. Thirty loads per acre of rotten horse-dung, mixed with brewers hops, were brought. The planting was performed by digging into beds about 8 feet wide, leaving a vacancy (not dug) of 2 feet for earthing it. The sets were placed 18 by 12 inches apart.

EXPENCES.

	1787, <i>October.</i>		£.	s.	d.
Ridging up, 2s. per acre	-	-	0	14	0
	1788, <i>March.</i>				
Drawing a furrow, 1s. 6d. per acre	-	-	0	10	6
	<i>April.</i>				
Cross-ploughing, 3s. per acre	-	-	1	1	0
Harrowing, 1s. 6d. per ditto	-	-	0	10	6
Planting, at 6d. per score yards	-	-	14	0	0
Seed (Scotch) 56 sacks, at 8s.	-	-	22	8	0
Manure, 200 loads, at 3s.	-	-	30	0	0
	<i>June.</i>				
Hoeing	-	-	1	15	0
	<i>July.</i>				
Earthing	-	-	3	10	0
			<hr/>		
		Carried over	£.74	9	0

			£.	s.	d.
	Brought forward	-	74	9	0
Digging out	-	-	14	14	0
Pitting and securing	-	-	5	4	0
Rent and tithe, 35s. per acre	-	-	12	5	0
Fencing and highway	-	-	0	3	6
Interest of capital	-	-	1	15	0
			<hr/>		
			£.108	10	6

## PRODUCE.

1110 sacks, prime cost 2s. per sack.

## OBSERVATION.

In this instance the expences are very heavy, but still the crop is so abundant that they cost only 2s. per sack. I consider this a great produce, being one of the best I ever had.

## NO. X. EIGHT ACRES.

A considerable part of which was in the year 1786 part of the forest of Mendip, and was ploughed in the winter, crops ploughed in May and June 1787, and between that time and October, part of it was limed ;—the remaining part was limed in the spring of 1788.

Part was planted in rows with the plough, and part on beds by hand. The beds the best crop ; and as the expence of hand-work does not exceed horse-work more than 8s. per acre,—the former

former I think is to be preferred. The part limed in 1787 was better than that limed in 1788.

EXPENCES.

1786-7.		£. s. d.
Cutting furze and levelling inequalities	-	20 0 0
<i>November and December.</i>		
First ploughing, 12s. per acre	-	48 0 0
<i>March.</i>		
Cross-ploughed half, 12s. per acre		48 0 0
Dragging, 6s. per ditto	-	24 0 0
<i>June to October.</i>		
800 quarters of lime, carriage, &c. 2s. per quarter	80	0 0
Harrowing 40 acres, 1s. per acre	-	2 0 0
Ridging ditto, 3s. per ditto	-	6 0 0
<i>1788, March and April.</i>		
810 quarters of lime, 2s. per quarter	-	81 0 0
Harrowing, 1s. per acre	-	2 0 0
Ploughing 40 acres, 3s. per ditto	-	6 0 0
Harrowing down, 2s. per ditto	-	4 0 0
Planting 40 acres, at 18s. per ditto	-	36 0 0
Seed, 320 facks, 5s.	-	80 0 0
Planting on 40 acres, 10s.	-	20 0 0
Seed, 240 facks, 6s.	-	60 0 0
Hoeing the whole, 5s. per acre	-	20 0 0
Digging out and securing	-	130 0 0
Rent (no tithe)	-	40 0 0
Interest of capital	-	20 0 0
		<hr/>
		£.727 0 0

PRODUCE.

4700 facks, prime cost, 3s. 1d. per fack.

OBSERVATIONS.

## OBSERVATIONS.

Though in this experiment, the potatoes appear to come high, yet what other crop would have paid expences so large, and in one year, and at the same time have left the land in so good a state? I do not know a better method of bringing rough land into tillage.

If corn be sown before the sward and rubbish are a little rotten, the grub generally attacks it, and frequently destroys it.

## EXP. NO. XI. TEN ACRES.

Soil, a gravelly loam. Part of this field was winter vetches, sown on a wheat stubble, and part spring vetches. In the beginning of May the winter vetches were hurdled off, and fed with sheep, and as fast as they were consumed, potatoes were planted in beds five feet wide, and intervals three feet, without any ploughing.

The spring vetches were sown the same, and the planting was not finished till the middle of June. As the vetches were put in dear, viz. three bushels per acre at 6s. per bushel, (9 gallon measure) I have debited the potatoes with the whole year's rent. It is a good way to mow the

VOL. VI. B b vetches,

vetches, and give them to the sheep in cribs, after withering a little; this will prevent sufflation—provincially called being blasted.

# EXPENCES.

1788, <i>May and June.</i>			<i>£. s. d.</i>
Planting, 21s. per acre	-	-	10 10 0
80 sacks of seed, (part Scotch)	-	-	24 0 0
<i>July.</i>			
Hoeing	-	-	2 10 0
Earthing up	-	-	2 10 0
<i>October and November.</i>			
Digging up and securing	-	-	20 0 0
Rent and tithe	-	-	17 10 0
Fences and highways	-	-	0 5 0
Interest of capital	-	-	2 10 0
			<i>£. 79 15 0</i>

# PRODUCE.

940 sacks, prime cost 1s. 8d. per sack.

In this experiment I could plainly perceive that the sheep-fold was an excellent manure for potatoes. Even those planted in June produced a good crop. I very strongly recommend this plan. It is compendious. It enables you to keep a large flock, and it is connected with a good course of husbandry—following up the potatoes with a spring crop and grass seeds.

EXP. NO. XII. TWENTY ACRES.

These were taken from the forest, and the soil for the most part, black earth, which is the name given to a species of land occasionally found in the forest, and which I have before observed will not in its natural state bring corn to perfection. Pared in the winter, and burnt in March, April, and May.

EXPENCES.

1788, <i>May.</i>		£.	s.	d.
Paring and burning, 21s. per acre	-	21	0	0
140 sacks of feed, 5s. per sack	-	35	0	0
Planting, 21s. per acre	-	21	0	0
<i>July.</i>				
Hoeing, 5s. per acre	-	5	0	0
Ploughing, digging out, and securing	-	20	0	0
Rent	-	5	0	0
Interest of capital	-	5	0	0
		<hr/>		
		£.	112	0

PRODUCE.

800 sacks, prime cost 2s. 9d. per sack.

N. B. Allowed 120 sacks for rotten ones.

OBSERVATION.

In consequence of a wet autumn and a late ripening, many of the potatoes rotted before they were dug, and many rotted after in the pits. Be



careful, therefore, when you plant land of this description, to plant early, and take out early.

1789.

EXPERIMENTS NO. XIII.— 6 ACRES.

XIV.—15

---

21 acres.

NO. XIII. SIX ACRES, AFTER WHEAT.

Soil, a gravelly loam. Ploughed the wheat stubble in October; cross-ploughed in March, and harrowed it well.

Drilled the potatoes in rows 2 feet apart, and manured with four ton of woollen rags, part of which had been soaked in the reservoir of hog's urine.

EXPENCES.

	1788, <i>October.</i>	£. s. d.
Ploughing, 3s. per acre	-	0 18 0
	1789, <i>March.</i>	
Cross-ploughing, 3s. ditto	-	0 18 0
Harrowing, 2s. ditto	-	0 12 0
Seed	-	10 0 0
Forming drills and planting, 15s. per acre	-	4 10 0
Rags and spreading	-	12 0 0
Hoeing	-	1 10 0
Ploughing out and securing	-	4 5 0
Rent and tithe	-	7 10 0
		<hr/>
Carried over		£.42 3 0

			£.	s.	d.
	Brought forward		42	3	0
Fences and highway	-	-	0	3	0
Interest of capital	-	-	1	10	0
			43	16	0

PRODUCE.

245 sacks, prime cost 3s. 9d. per sack.

OBSERVATIONS.

These potatoes came up very curled, which I could not attribute to any defect in the seed, as I had some of the same potatoes planted in another field, which came up well;—from hence, as well as some other trials with different crops, such as wheat, flax, &c. I am led to conclude, that rags do not suit my soil, particularly as I cannot see any effect in the field, at this time, and surely they must now be rotten.

EXP. NO. XIV. FIFTEEN ACRES,

Old ley. This field was planted and managed the same as No. 2 in the year 1785.

EXPENCES.

	1789, May.		£.	s.	d.
Planting, 1l. 11s. 6d. per acre	-		23	12	6
Seed, 107 sacks, at 5s. per sack	-		26	15	0
Cutting ditto	-	-	1	6	9
Manure	-	-	45	0	0
			<hr/>		
	Carried over		£.96	14	3

<i>June.</i>	Brought up	£.96 14 3
Hoeing, 5s. per acre	-	3 15 0
Earthing, 5s. per acre	-	3 15 0
Weeding by hand	-	1 17 6
Digging and securing	-	22 10 0
Rent and tithe	-	18 0 0
Fences and highways	-	0 7 6
Interest of capital	-	3 15 0
		<hr/>
		£.150 14 3

PRODUCE.

1250 sacks, prime cost 2s. 5d. per sack.

1790.

EXPERIMENTS NO. XV.—6 ACRES.

XVI.—8

---

14 acres.

EXP. NO. XV. SIX ACRES,

Of black earth, such as I have before described;—  
this was fallowed and limed in the year 1789, in  
conjunction with 40 acres of red earth which was  
then sown with wheat.

This was left unsown in consequence of its inferti-  
lity in respect to corn. In the beginning of May  
it was harrowed merely to make the surface a  
little fresh, and then planted in beds 5 feet by 3  
feet. The produce, at 3s. per sack, amounted  
to double the value of the wheat crop, though  
that was six sacks per acre. Labourers becoming  
very

very scarce in consequence of the tempting offers of the Bristol and Bath builders, I was obliged to hire men, at 2s. per day and beer, from a distant part of the country to dig them out. These men would not dig by the sack, and consequently the expences were enormously high. I verily think that my own men, who worked by contract, did as much in one day as the others did in two. In short, manual labour is become so dear, and labourers so scarce, that it is now impossible to cultivate this root on a large scale;—and I must (though reluctantly) be contented with a limited quantity.

## EXPENCES.

	1789.	£. s. d.
Ploughing, liming, &c. 4l. per acre	-	24 0 0
Planting, 2rs. per acre	-	6 6 0
Seed 46 sacks	-	11 10 0
N. B. No hoeing necessary.		
Digging out, hauling, and securing	-	20 3 0
Rent	-	3 0 0
Interest of capital	-	1 10 0
		<hr/>
		£.66 9 0

## PRODUCE.

542 sacks, prime cost 2s. 6d. per sack.

## EXPERIMENT NO. XVI.—EIGHT ACRES,

Rough wet land. This field was pared at the expence of 12s. per acre; but the spring being very wet,

wet, it could not be burnt. The potatoes therefore were dug in without any manure, in beds about 8 feet wide, leaving a deep furrow between the beds to let off the moisture.

The pared turf was laid under the sets, and then a spit dug on them. In the greatest part of the field I planted *whole* potatoes, and of the magpie sort, which do better without manure than the white Scotch. In a small part I had the sets cut in two pieces; and at digging, it appeared to me that the potatoes were larger and of greater weight per acre than those produced by the whole sets.

EXPENCES.

1790, <i>March.</i>			£.	s.	d.
Paring, at 12s. per acre	-	-	4	16	0
<i>May.</i>					
Planting	-	-	14	7	0
Seed, 12 sacks per acre, 4s. per sack	-	-	19	4	0
<i>July.</i>					
Hoeing and earthing	-	-	2	2	0
Keeping birds off	-	-	0	15	8
Digging and securing	-	-	12	17	11
Rent and tithe	-	-	6	0	0
Fences, &c.	-	-	0	4	0
Interest of capital	-	-	2	0	0
			<hr/>		
			£.62	6	7

PRODUCE.

365 sacks, prime cost 3s. 6d. per sack.

# RECAPITULATION.

EXPER. NO.	EXPENCES.			PRODUCE.		
	<i>Acres.</i>	<i>Per acre.</i>	<i>Total.</i>	<i>Sacks.</i>	<i>s. d.</i>	<i>£. s. d.</i>
		<i>£. s. d.</i>	<i>£. s. d.</i>			
			1784.			
1	7 fallowed	10 1 0	70 7 2	505 at 2	10	71 10 0
			1785.			
2	8 ley	10 14 0	85 12 6	564 — 3	0	84 12 0
3	12 fallow	8 0 0	95 16 0	621 — 3	1	95 14 0
4	12 ditto	8 16 0	105 15 0	968 — 2	2	104 17 0
			1786.			
5	50 ditto	10 11 0	527 8 0	3850 — 2	9	528 17 0
			1787.			
6	8 ditto	9 4 0	73 14 0	564 — 2	8	75 0 0
7	2 forest	12 10 0	25 0 4	220 — 2	3	24 15 0
8	50 ley	10 2 0	505 5 0	3680 — 2	9	506 0 0
			1788.			
9	7 fallow	15 10 0	108 10 6	1110 — 2	0	111 0 0
10	80 ditto	9 2 0	727 0 0	4700 — 3	1	724 0 0
11	10 vetches	8 0 0	79 15 0	940 — 1	8	78 6 0
12	20 burnt	5 12 0	112 0 0	800 — 2	9	110 0 0
			1789.			
13	6 fallow	7 6 0	43 16 0	245 — 3	9	45 18 9
14	15 ley	10 0 0	150 14 3	1250 — 2	5	151 16 0
			1790.			
15	6 fallow	11 0 0	66 9 0	542 — 2	6	67 15 0
16	8 rough	7 16 0	62 6 7	365 — 3	6	63 17 6
	<u>301 acres.</u>		<u>2839 2 4</u>	<u>20924 sacks</u>		<u>2843 18 3</u>

Average expences per acre 9l. 9s. 3d.

Average produce per acre about 70 sacks.

Average value per acre, prime cost about 2s. 9d. per sack of 240 lb.

1784-5.

## EXPERIMENTS ON FEEDING HOGS.

[It may be necessary to premise that though in the subsequent accounts the expences and consumption of the hogs are in sums total; yet the account was taken regularly every month, and it is now brought into gross sums, merely to shorten the account.]

## NO. I. EXPENCES.

1785, January 5.		£.	s.	d.
To 12 hogs bought at 25s. each	-	15	0	0
April 13.				
To attendance, boiling food, serving, &c.				
14 weeks	-	1	15	0
To carriage of pot to boiling-house	-	0	17	6
To coal, 24 bushels, at 6d. per bushel	-	0	12	0
To 115 sacks potatoes, prime cost 2s. 10d. per sack	16	5	10	
*To 7½ quarters of barley and oatmeal, 22s. 6d.				
per quarter	-	8	8	6
To straw, 3½ waggon loads, 10s. per load	-	1	15	0
To killing	-	0	4	0
To hauling to Bath	-	0	12	0
		£.45	9	10

## PRODUCE.

1786, April.				
By 12 hogs sold to Symes, 146½ score at 7s.				
per score	-	51	5	6
By 30 cart-loads of dung, 2s. in place	-	3	0	0
		54	5	6
Expences		45	9	10
Profit		£.8	15	8

\* Nine gallon measure.

## OBSERVATIONS.

It appeared by this experiment that hogs would pay 4s. per sack for potatoes; but certain favourable circumstances were connected with this trial. The hogs were bought in remarkably cheap; they took to the food with great good-will, and they were all of them what are called proving hogs. I have in many of the subsequent experiments bought hogs in no wise better than these at 35s. or 40s. each. Barley and oats were also at a moderate price, at least such as I gave them, which was not of the best sort.

Encouraged however by this experiment, I was induced to enter on a larger scale into this mode of applying the potatoe crop. I accordingly built a boiling-house and sties; put up a cast-iron furnace, capable of holding two hogsheds; a pump; bought some old oil-casks, at 10s. each, to hold the wash; the cost of all which amounted to about 70l.

As the house proved very convenient, I shall describe it. It was of one story, and about 16 feet square, built with stone, and covered with tile. In the room below were the furnace, tubs, &c. and the upper room had a large door, opening to a road-way;



way; through this door the potatoes were thrown into the room out of the waggon. In this upper room was a pump, which conveyed water to a large trough, in which the potatoes were washed; and from which they were immediately thrown into the furnace beneath. The foul water was let out thro' an aperture in the wall, adjoining the trough. The potatoes were washed in a wire sieve.

By this saving of labour, one man could serve 90 or 100 hogs. Adjoining the boiling-house, were sties, divided into eight compartments, and capable of lodging 80 or 90 hogs. Into these sties I put 80 slips of my own, and 10 old sows. I also divided an ox-stall in another part of my farm for the accommodation of a larger lot, to be purchased; and having an old brewing-furnace, I put it up at a small expence, being sanguine in my hopes of success; but at my first outset, disappointment stared me in the face—for going to Bristol to purchase hogs, I found them so enormously dear, that I could see no prospect of their paying any thing. However, I bought 112 as cheap as I could, and after they were home, I weighed them and found that they cost 6s. per score, live weight. I was in justice therefore bound to value my own sows and slips at a high rate.

1785-6.

## EXPERIMENT, NO. II.

## EXPENCES.

1785, <i>December</i> 3.		£. s. d.
To 10 old fows, 30s.	-	15 0 0
To 80 flps, 6 months old, 25s.	-	100 0 0
1786, <i>January</i> 31.		
To attendance 8½ weeks	-	3 3 0
To hauling potatoes	-	2 15 0
To potatoes 410 sacks, prime cost 2s. 9d. per sack	56	7 6
To coal 60 bushels, at 6d. per bushel	-	1 10 0
To buck-wheat, 7 quarters at 25s. per qr. ground	8	15 0
To barley and oatmeal, 18 quarters at 24s. per qr.	21	12 0
To straw, 8 loads, at 10s.	-	4 0 0
To killing 9 fows	-	0 4 0
To hauling to Bath	-	0 12 0
		£.213 18 6

## PRODUCE.

1786, <i>January</i> 31.		
By 77 porkers sold at home for	-	154 0 0
[Three died.]		
By 9 fows to Cottle, average 14 score each, at		
5s. 6d. per score	-	34 13 0
[One died.]		
By 70 cart loads of dung, at 2s. per load	-	7 0 0
		£.195 13 0
Loss	-	£18 5 6

EXPERIMENT NO. III.

EXPENCES.

1785, *December 27.*

To 112 hogs bought at Bristol, 40s. per hog      224   0   0

1786, *April 25.*

To attendance 17 weeks, 12s. per week, lay      10   0   0

To hauling potatoes      -      10   0   0

To potatoes, 1244 sacks, at 2s. 9d. per sack,  
prime cost      -      171   1   0

To coal, 150 bushels, at 6d. per bushel      -      3   15   0

To barley and oatmeal, 54 quarters, at 24s. per qr.      64   16   0

To tailing wheat-meal, 3 quarters, 40s. per qr.      6   0   0

To straw, 30 loads, 10s. per load      -      15   0   0

To killing, at 4d. per head      -      1   16   4

To hauling to Bath, 8 journies      -      6   0   0

---

£.512   8   4

PRODUCE.

1786, *April 20, 25, May 2.*

By 110 fold, average weight 13 score, 7s. per score      500   10   0

[Two died.]

By 200 loads of dung, 2s. per load      -      20   0   0

---

£.520   10   0

Profit   £.8   1   8.

OBSERVATIONS.

In the course of the foregoing experiment many observations were made. I found that the water in which the potatoes were boiled was injurious, and therefore avoided mixing it even with the meal.

I also

I also plainly perceived, that the potatoes were better liked when slightly boiled, than when boiled to a pulp.

The preference to be given to large hogs was confirmed, for the small growing pigs ate nearly as much food as the large full-grown hogs, and yet they did not appear proportionably to improve either in size or fat. I experienced also a great amendment in the quality of the wash, when a quantity of meal was mixed up a week or two before it was used. In this way a kind of fermentation is produced, and spirit, I presume, generated. At the commencement of the business, I found many of the hogs ate the potatoes with reluctance, particularly when given raw, and I invariably found that the quantity of food consumed increased every week, till the animal became three parts fat; after this period they ate but little, and almost all they ate turned to fat. It is therefore good policy to make them compleatly fat, and that can only be done by giving time.

Lastly, I found by this experiment, that farther trials were necessary, to justify the *sanguine* ideas I had formed of potatoes, from my first experiment.

1786-7.

## EXPERIMENT NO. IV,

## EXPENCES.

1786, <i>Nov.</i> 15, 19, 26.	£. s. d.
To 107 flips, my own, valued -	103 14 6
To 212 bought at Bristol, at 5s. 3d. per score, live weight - - -	487 12 0
To attendance on 107, ten weeks -	9 9 0
To ditto on 212, eighteen weeks -	18 18 0
To hauling potatoes - - -	26 0 0
To potatoes 3097 sacks, at 2s. 9d. per sack	425 17 0
To coal, 420 bushels, at 6d. - -	10 10 0
To barley and oats, 124 quarters at 24s.	148 16 8
To tailing wheat, 10 quarters at 40s. per qr.	20 0 0
To straw, 70 loads, 10s. per load -	35 0 0
To killing 210, at 4d. each - -	3 10 0
To hauling out - - -	15 0 0
To salt given with the potatoes -	3 0 0
	<hr/>
	£.1307 6 6

## PRODUCE.

1788, <i>January</i> 15, 20, 26.	
By 104 porkers sold for 34s. each -	176 16 0
[Three died.]	
<i>March</i> 20, 26, 31, <i>April</i> 2.	
By 209 hogs, average weight 15 score each, at 7s. per score - - -	1097 5 0
[Three died.]	
By 350 loads of dung, at 2s. per load -	35 0 0
	<hr/>
	£.1309 1 0
Profit - £.1 14 6.	

OBSERVATION.

OBSERVATION.

The large Hogs still have the preference; and as far as I can judge, salt given with the potatoes is very useful. It tempts the hogs to eat them with great avidity. From a few days trial, I am inclined to think that a little malted barley, or oats, mixed in their wash, would do good; but the severity of the excise laws is a great obstacle to useful experiments.

1787-8.

EXPERIMENT, NO. V.

EXPENCES.

<i>November 2, 4.</i>			<i>£. s. d.</i>
6 sows and a cut boar (my own)	-	-	12 0 0
66 slips, (my own) valued	-	-	74 0 0
15 bought at Bristol	-	-	35 3 6
<i>December 2, 12, 26.</i>			
40 bought at Bristol	-	-	83 0 0
65 ditto	-	-	143 8 0
92 ditto	-	-	155 12 0
<i>January 4, 20.</i>			
166 small hogs	-	-	201 0 0
Attendance on 66, eleven weeks	-	-	3 17 0
Carried over			<i>£. 708 0 6</i>

		£.	s.	d.
<i>May.</i>	Brought forward	708	0	6
Attendance on 384, nineteen weeks	-	43	0	0
Hauling potatoes	-	29	0	0
Potatoes, 3760 sacks, at nearly 2s. 9d. a sack	-	517	0	0
Coal, 600 bushels, at 6d. per bushel, 9 gallons	-	15	0	0
Barley and oatmeal, 180 quarters, at 24s. per qr.	-	216	0	0
Salt	-	6	0	0
Straw, 110 loads, at 10s. per load	-	55	0	0
Killing 381, at 4d. each	-	6	6	8
Hauling to purchasers	-	25	0	0
		<hr/>		
		£.1620	7	2

# PRODUCE.

1789, *January* 18, 24.

61 porkers, at 35s. each - - 106 15 0

[Five died.]

*February* 26.

6 fows, &c. 73 score, at 5s. 6d. per score 20 1 6  
 375 fows, average weight 11 score each, at  
 6s. 9d. per score - - 1268 15 0

[Three died.]

680 loads of dung, at 2s. per load - 68 0 0

---

£.1463 11 6

Loss - £.156 15 8.

# OBSERVATIONS.

Here was an alarming loss indeed; but some compensation was made by a considerable sale, this winter,

winter, and in the spring, of potatoes for the table. The average price of which was about 6s. per sack: this reduced the loss on the whole to about 40l. The bad success of this year's experiment seemed to arise from the hogs which were bought being small and very dear. Few large hogs could be procured at any price.

1788-9.

EXPERIMENT, NO. VI.

EXPENCES.

1788, <i>October</i> 6, 8, 15.		£.	s.	d.
14 spay'd fows, 31s. 6d each	-	22	1	0
79 hogs bought at Bristol	-	143	0	0
243 ditto	-	492	0	0
1789, <i>February</i> 15.				
Attendance, 17 weeks	-	27	0	0
Hauling potatoes	-	36	0	0
Potatoes, 4032 sacks, at 2s. 8d. prime cost		537	12	0
Coal, 672 bushels, at 6d. per bushel	-	16	16	0
Barley, buck-wheat, and oatmeal, 160 quarters		186	13	0
Salt	-	7	0	0
Straw, 125 loads	-	62	10	0
Killing 336, at 4d. each	-	5	12	0
Carriage to Bath and Bristol	-	22	0	0
		<hr/>		
		£.	1558	4 0

PRODUCE.

*February* 8.

14 spay'd fows, sold at 5s. 6d. per score, each				
fow 16 score	-	-	61	12 0

C c 2

*February*



Brought forward £.611 12 0

February 8, 16, 22.

322 hogs, average 14½ score, 6s. 10d. per score 1567 0 0

N. B. None died.

720 loads of dung, at 2s. per load -

Profit £.142 8 0: £.1700 12 0

#### OBSERVATIONS.

The foregoing experiment shews, that no kind pays more for the food than ipry'd sows. It is true, they are not worth so much as other fat hogs, by near 1s. per score, particularly if they are heavy,—but then they get fat quicker, and on less food.

In the course of this experiment, I tried grinding the potatoes in an old apple-mill, instead of boiling, but did not find it answer. If room could have been found, to have mixed them with meal, and deposited them in a reservoir, so as to have fermented, it might have succeeded. Having near half of my potatoes left, I resolved to fat another lot; but as the spring was near at hand, I was obliged to purchase smaller hogs, thinking that large ones would not be saleable. The disposition of the buyers seemed to be much changed; for though they did not regard a few years since how large fat hogs were, yet  
now

now they declined purchasing in the spring a higher weight than 10 score per hog.

1788-9.

EXPERIMENT, NO. VII.

EXPENCES.

			£.	s.	d.
	1789, <i>March</i> 1.				
300 hogs, at 22s. 6d.	-	-	337	10	0
	<i>June</i> 3.				
Attendance 13 weeks	-	-	20	10	0
Hauling potatoes	-	-	20	0	0
Potatoes, 2600 sacks, at 2s. 8d. per sack	-	-	346	13	0
Coal, 520 bushels, at 6d. per bushel	-	-	13	0	0
Barley, buck-wheat, and oat-meal, 120 qrs.	-	-	144	0	0
Salt	-	-	4	0	0
Straw, 100 loads, 10s. per load	-	-	50	0	0
Killing 296, at 4d. each	-	-	4	18	0
Carriage to Bath	-	-	18	0	0
			£.958	11	8

PRODUCE.

	<i>June.</i>				
296, average weight $7\frac{1}{2}$ score, 7s. 6d. per score	832	10	0		
600 loads of dung, at 2s. per load	-	60	0	0	
			£.892	10	0
Loss	£.66	1	8.		

OBSERVATIONS.

## OBSERVATIONS.

The preference to be given to large hogs is, again confirmed. These young pigs were always restless; it was very difficult to keep them in the sties; and had they not been carefully ringed, they would have worked up with their noses all the pitching. They were always covered with filth; for though littered very well, we could not keep them clean. They grew instead of getting fat.

1789-90.

## EXPERIMENT, NO. VIII.

## EXPENCES.

	1789, <i>Nov.</i> 15.		£. s. d.
96 large hogs, at 50s. each	-	-	240 0 0
	1790, <i>April.</i>		
Attendance 20 weeks	-	-	9 0 0
Hauling potatoes	-	-	8 0 0
Potatoes, 1220 sacks, at 2s. 8d. per sack	-	-	162 13 0
Coal, 320 bushels, at 6d. per bushel	-	-	8 0 0
Barley and oatmeal, 90 quarters, 25s. per qr.	-	-	112 10 0
Grains, 300 bushels, 4d. per bushel	-	-	5 0 0
Salt	-	-	3 0 0
Straw, 30 loads, at 10s. per load	-	-	15 0 0
Killing 96, at 4d. each	-	-	1 12 0
Carriage	-	-	8 0 0
			<hr/>
			£.572 15 0

## PRODUCE.

PRODUCE.

1790, *April.*

96 hogs, average weight 17 score each, 7s. a score	571	4	0
200 loads of dung, 2s. per load	-	10	0 0
		<hr/>	
Profit	£.8	9	0.
		£.581	4 0

OBSERVATIONS.

This experiment was conducted with particular accuracy; and from the result of it I was led to conclude, that, unless circumstances were particularly favourable, 2s. 8d. per sack was the utmost value of potatoes under the best management, in this mode of application.

The hogs were of the Shropshire sort, large and fine; and though bought in dear, they also sold out dear. Excepting two or three, they all proved very well.

1790-1.

EXPERIMENT, NO. IX.

	1790, <i>October.</i>	£.	s.	d.
Seven fows and pigs, 50s. each	-	24	10	0
	1791, <i>April.</i>			
Attendance 6 months	-	5	0	0
		<hr/>		
	Carried over	£.29	10	0

		£.	s.	d.
	Brought forward	29	10	0
Potatoes, 300 sacks, at 3s. 6d. per sack	-	22	10	0
Barley and oatmeal, 24 quarters	-	30	0	0
Hauling potatoes	-	2	13	0
Coal, 70 bushels, at 6d. per bushel	-	1	15	0
Grains, 100 bushels	-	1	13	0
Straw, 12 loads	-	6	0	0
		<hr/>		
		£.93	18	0

## PRODUCE.

1791, *April*.

Seven fows, valued, being with young	-	17	10	0
Forty-two slips, 25s. each	-	52	10	0
[Eight died.]				
Dung, 100 loads, at 2s. per load	-	10	0	0
		<hr/>		
		£.80	0	0

Loss £.13 18 0.

## OBSERVATIONS.

I am disposed to think that rearing pigs cannot well be effected without the assistance of the dairy; and if you do attempt to rear without *that* assistance, avoid having any litters at the approach of winter. The cold will pinch the young pigs; and if they are once stopt in their growth, or as it is vulgarly called *knit*, the best keeping *afterwards* will not recover them.

## RECAPITULATION.

## RECAPITULATION.

PROFIT.	£.	s.	d.		LOSS.	£.	s.	d.
1785, Exp. i.	-	8	15	8	1786, Exp. i.	18	5	6
1786, — iii.	-	8	1	8	1788, — v.	156	16	8
1787, — iv.	-	1	14	6	1789, — vii.	66	1	8
1789, — vi.	142	8	0		1791, — ix.	13	18	0
1790, — viii.	-	8	9	0				
						255	0	10
	169	8	10					
Balance lost	85	12	0		By balance lost	85	12	0
					By fundry expenses			
£.255	0	10			in erecting boil-			
					ing-houses, sties,			
					&c. &c.	-	100	0
						£.185	12	0

At 2s. 9d. per sack, this loss is incurred in feeding hogs for seven years.

## OBSERVATIONS.

It appears by the preceding accounts that 16,778 sacks of potatoes have been consumed by hogs in the seven years' experiments, and consequently (the sum total raised being 20,924 sacks) that 4146 sacks have been sold and planted. Estimating these therefore, at an average of 4s. per sack, a profit will remain (after deducting the above loss, viz. 185l. 12s.) of 73l. 10s. 6d. The result, therefore, is, that potatoes are worth, as a food for hogs, something more than 2s. 6d. per sack of 240lb. weight.

Potatoes will shrink in pit between the months November and March, about one sixth in twenty: when pitted, I allow in my calculation of the quantity there deposited after that proportion.

I am now proceeding in a course of experiments to ascertain the value of potatoes as a food for horses, cows, fatting oxen, and sheep; which shall in due time be laid before the Society, should they think it worthy their notice.

I am, Gentlemen, your's, &c.

J. BILLINGSLEY.

ASHWICK-GROVE,

July 1, 1792.

END OF VOL VI.

**ERRATUM.** Page 366, for 32-feet, read *three-feet*.



DIRECTIONS FOR PLACING THE PLATES.

OAK TREES.

Plate I.	-	-	Page 54	Plate IV.	-	-	Page 58
II. and III.	-	-	57	V. and VI.	-	-	59
SWORD-CUTTER				-	page 72		

NEW EDITIONS  
OF THE  
FIVE PRECEDING VOLUMES  
OF THE  
BATH SOCIETY'S PAPERS,  
WITH THE PLATES,

May be had in Boards, price 11. 8s. or either Volume separately.

*Also, price 1s. 6d. each,*

I.

An ESSAY on the PRESERVATION of the HEALTH of  
PERSONS employed in AGRICULTURE, and on the NATURE  
of the DISEASES incident to that Way of Life.

By WILLIAM FALCONER, M. D. F. R. S.  
And Physician to the Bath Hospital.

II.

CAUTIONS concerning the POISON of LEAD and of  
COPPER; with a Method of detecting these Metals in Wines,  
Cyder, and various other Aliments.

By A. FOTHERGILL, M. D. F. R. S.  
Member of the Royal College of Physicians, London; and of the  
Medical Societies of London, Edinburgh, and Paris.





